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EPA Superfund
Record of Decision:

Amoco Chemicals (Joliet Landfill)
Joliet, IL
7/15/1999

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276

THOMAS V. SKINNER, DIRECTOR

217/785-8729

July 27, 1999

Mr. Jon Peterson
Office of Superfund (S-6J)
USEPA Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604

Reference: **Amoco Chemical Joliet Landfill**
1978000001 Will County
People v. Amoco/Case No. 94C00869
Superfund Technical - ROD Transmittal

Dear Mr. Peterson:

Enclosed please find one copy of the July 1999, Record of Decision and the Declaration for the Record of Decision regarding the above-referenced Superfund site.

Please contact me at the above-listed phone number c: address if you have questions.

Sincerely,

Robert Rogers
Remedial Project Manager
Federal Site Remediation Section
Division of Remediation Management
Bureau of Land

cc: Bureau File wo/enclosures

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Amoco Chemicals (Joliet Landfill)
Joliet, Illinois

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Amoco Chemicals (Joliet Landfill) in Will County, Illinois, which was chosen in accordance with the Illinois Environmental Protection Act, 415 ILCS 5/1 et seq.; the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§ 9601 et seq. by the Superfund Amendments and Reauthorization Act of 1986; and the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Part 300. This decision is based on the Administrative Record for this site. The United States Environmental Protection Agency Region V ("U.S. EPA") concurs with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial endangerment to the public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

The remedial action addresses the Landfill Operable Unit of the two operable units identified for this site. The Groundwater Operable Unit will be handled under a separate Record of Decision. The remedial action focuses on a source of groundwater contamination by placing a Resource Conservation and Recovery Act ("RCRA"), as amended, 42 U.S.C. §§ 6901 et seq., compliant cap on the two landfills and installing a new leachate collection system. The function of this action is to properly close the landfills, to control the migration of landfill contaminants to the groundwater and other media, to reduce the risks associated with exposure to contaminated materials, and to prevent untreated leachate from migrating off site.

The major components of the selected remedy include:

- The construction RCRA compliant landfill cap conforming to the requirements in 35 Ill. Adm. Code Part 724;
- Installation of a gas venting system;
- Installation of a new leachate collection system down gradient of the southern landfill and a new leachate collection system down gradient of the southern portion of the north landfill;
- Installation of surface water management features to minimize erosion and infiltration:

- Groundwater monitoring;
- Physical access restrictions will be maintained;
- Real estate deed restrictions.

DECLARATION

The selected remedy is protective of human health and the environment, complies with the Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principle element.

Because this remedy will result in hazardous substances remaining on site, the State is expected to supply information such that the U.S. EPA can conduct a review within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Thomas V. Skinner, Director
Illinois Environmental Protection Agency

7.15.99
Date

RECORD OF DECISION

for

AMOCO CHEMICALS (JOLIET LANDFILL) SUPERFUND SITE LANDFILL OPERABLE UNIT

Record of Decision Summary
Amoco Chemicals (Joliet Landfill) Superfund Site
Landfill Operable Unit
Will County, Illinois

I. Site Location and Description

A manufacturing facility owned by the Amoco Chemical Company a/k/a BP Amoco Chemical Company ("BP Amoco") is located approximately one mile southeast of the intersection of Illinois Route 6 and Interstate Highway 55 (See Figure 1). It is an active chemical manufacturing facility located on approximately 750 acres of land in a semi-rural industrial/agricultural area. The facility is near Joliet, Illinois in Will County on the west bank of the Des Plaines River.

For the purpose of this document, the Amoco Chemicals (Joliet Landfill) Superfund Site and the contiguous contamination will be referred to as the "site". References to the existing manufacturing facility will be "facility".

The BP Amoco manufacturing facility has been in continuous operation since approximately 1958, manufacturing purified isophthalic acid ("PIA"), trimellitic anhydride ("TMA"), maleic anhydride ("MA"), and polystyrene (IT Corp., 1997). The manufacturing wastes generated by the facility were contained in thin wall, rust away drums and disposed into two landfills (north and south landfills) on the site which were closed in the mid-1970s. The closed landfill areas cover approximately 26 acres. The former landfill areas, consisting of two parcels which are roughly triangular in shape, are located in the southern portion of the property. A gravel road along the bluff above the Des Plaines River forms the eastern and southern boundaries of the landfills as shown in Figure 2. The landfills are located within 600 feet of the western bank of the Des Plaines River. The landfills are sited on a bluff approximately 54 feet above the 100-year flood plain. Land to the east of the northern part of the site drops off sharply to a level bench which extends east for about 150 feet. This bench then drops again to the river flood plain. The first bench below the landfills is about 24 to 36 feet above the 100-year flood plain. Farther south, land drops rapidly to a lower bench, 12 to 18 feet above the 100-year flood plain. The bench area is greater than 300 feet wide in places. The banks then drop steeply to the river. The landfills are underlain by up to 30 feet of unconsolidated glacial deposits ranging from clayey tills to sand and gravel drift deposits. The glacial deposits overlie Ordovician-aged limestone of the Fort Atkinson Formation, which then gives way to Scales Shale. The latter is a regional aquitard separating the shallow glacial and bedrock aquifers from the deeper regional aquifers. The Sandwich Fault Zone strikes southeast to northwest under the landfill. The Scales aquifers. The Sandwich Fault Zone strikes southeast to northwest under the landfill. The Scales Shale is disrupted by the faulting associated with the Sandwich Fault Zone in the site area.

Groundwater in the glacial deposits and shallow bedrock generally flows east toward the Des Plaines River. However, south of the landfills, the river bends west and groundwater may flow in a more southerly direction.

Three leachate seeps were observed during an April 10, 1996, Illinois EPA facility inspection. Two seeps were observed near the bluff east of the landfill and one seep was observed approximately 150 feet from the river. All three seeps were located above the 100-year floodplain. Wetland areas as defined by growth of cattails (*Typha augustifolia*), occur in red-orange stained soils located just upgradient of the present leachate collection system. At least one seep area is located down gradient of the leachate collection system on the face of a slope just above the river flood plain. The soil associated with this seep area is also stained red-orange, suggesting that some impacted groundwater and leachate are bypassing current containment.

II. Site Operational History

The contents of the landfill include approximately 5,900,000 cubic feet (218,518 cubic yards) of wastes, some in 55-gallon drums, including organics, inorganics, heavy metals, acids, and general plant refuse. The United States Environmental Protection Agency ("U.S. EPA") suggested in 1983 that 135,000 tons of chemical wastes were probably contained in the landfills, including plasticizers, resins, elastomers, ethers, esters, ketones, aldehydes, inorganic chemicals (salts and asbestos, acids and heavy metals).

Specifically, BP Amoco records indicate disposal of solid wastes containing isophthalic, terephthalic, benzoic, toluic and trimellitic acids, aromatic aldehydes, cobalt and manganese acetates, cobalt, manganese, cerium and "other metal" oxides, sodium bromide, zinc and "other metal salts," acetic acid, "tar and high boilers," and polystyrene. Liquid slurries and "semi-solid" wastes were also disposed which contained many of the above constituents as well as dimethylterephthalate, styrene, mineral oil and rubber, chromium, iron, and copper. Records also indicate that activated carbon (with associated isophthalic and terephthalic acids), construction materials, insulation, and general refuse were placed in the landfills. Solid wastes and liquid slurries were reported to have low pH, in the range of 2.5 to 4.8.

The northern or main landfill was operated by clearing the shallow soils associated with the former farm land and leveling the areas for disposal of wastes. No liner or clay material was placed beneath the wastes in the northern landfill. In some cases excavations or pits were used for disposal of material. Historical BP Amoco records indicate that the average base elevation (bottom of fill material) of the landfilled wastes in the northern landfill is generally 3 to 20 feet above the water table (see Figures 10 & 11). Potential exceptions where waste may intercept the water table are observed in aerial photographs. One excavation (approximately 200 feet in diameter) along the east side of the landfill appears to be over 30 feet in depth while the top of the groundwater surface is approximately 20 feet in depth for that area.

In general, waste material, including drums, solids and some liquids, were placed on the ground surface or in excavations and then covered with stockpiled dirt. The cover material for the northern landfill was excavated from the area now occupied by the southern, smaller landfill area. The excavated material and the remaining soils in the southern landfill are comprised of predominantly silty clays. The bottom elevation of the southern landfill area (top of excavated clays) is approximately seven feet below the water table at the north edge.

Historical aerial photographs indicate that landfilling operations did not extend to the bluff east of the north landfill. Landfill operations at the south landfill, however, appear to have extended beyond the former landfill road which runs along the bluff.

In 1972, a large portion of the landfill area was closed. This area was leveled, sloped toward the river, covered with two feet of clayey soil, and covered with one to two feet of clay to reduce infiltration. In 1973, the smaller southern landfill area began receiving process waste. The clayey soil which was excavated in this smaller triangular area was eventually used as cover material for the landfill to the north. Historical drawings provided by BP Amoco indicate a four foot layer of clay remained in the southern landfill to act as a liner. Disposal into the south landfill continued until 1975. No monitoring of landfill containment was performed subsequent to closure.

III. Site Enforcement Activities

There have been several historical documented releases associated with the site. On July 2, 1974, the Illinois Environmental Protection Agency ("Illinois EPA") observed a reddish leachate discharging into the Des Plaines River and traced its origin to the landfill area. The leachate apparently contained iron, manganese, ammonia, phosphorus and phenol. The plume extended 15 to 20 feet into a quiet backwater area of the river before the red staining was no longer observed.

Two separate leachate sources were later identified, one from the closed, the other from the then still active landfill. One of the sources was actually a natural stream, contaminated with seepage from the landfills. This stream contained concentrations of several contaminants in excess of Illinois effluent standards for biological oxygen demand, suspended solids, iron, manganese, phenolics and dissolved solids. Elevated levels of alkalinity, chemical oxygen demand, total organic carbon, chlorides, and cobalt were also detected.

A leachate recovery system was installed by BP Amoco in March 1975. The system was designed to intercept leachate moving laterally down gradient toward the Des Plaines River in the shallow groundwater. The system was upgraded in 1988. More recent visits (mid-1990s), however, suggest that groundwater and leachate may be escaping containment as evidenced by iron staining on the ground surface emanating from the south end of the collection system to 150 plus feet down gradient as well as iron staining on a small stream outcrop down gradient of the collection system near the backwater area east of the landfill.

In March 1987, the U.S. EPA scored the landfills using the hazard ranking system ("HRS") and assigned the site a score of 39.44. A facility which receives a score of 28.5 or higher is a candidate for the National Priorities List ("NPL"). In June 1988, the U.S. EPA nominated the landfill for placement on the NPL. BP Amoco submitted a letter to the U.S. EPA in August 1988, in response to the listing. The response detailed reasons why the company believed the site should not be on the NPL, and contended that the HRS score was inappropriate for the site conditions. BP Amoco's position was not accepted and the site was added to the NPL on February 21, 1990.

On April 7, 1994, a Consent Decree ("CD") requiring a Remedial Investigation/Feasibility Study ("RI/FS") was entered. BP Amoco initiated the RI/FS as stipulated by the CD. In early 1998, an agreement between the Illinois EPA and BP Amoco split the site into two operable units: one for the landfills and the other for the contaminated groundwater. This decision enabled the development of a Focused Feasibility Study ("FFS") concerning only capping the landfills. Due to the dispute resolution of unreconcilable differences, the Illinois EPA exercised its rights under the CD and relieved BP Amoco of the task of conducting the RI/FS. The RI was completed on March 25, 1998, and the FFS on October 5, 1998.

The manufacturing facility north of the landfill is currently conducting remedial activities under the Illinois EPA Site Remediation Program ("SRP"). The manufacturing plant portion of the facility entered into the Illinois EPA Pre-Notice program (now known as the SRP) officially in November of 1993, primarily in response to a xylene spill in the southeastern portion of the plant area. Groundwater data for the plant area was collected in 1992/1993 and in 1994. This information was used to prepare a Corrective Action Plan that was submitted to the Illinois EPA. In 1998, BP Amoco installed a groundwater recovery trench located to the east of the northern third of the north landfill. The trench is not part of the NPL site remedy.

IV. Community Relations Activities

In 1991, BP Amoco convened a Citizens Advisory Panel to provide a channel for communication between the company and nearby residents from Will County. The Illinois EPA developed two repositories which are stocked with the investigatory information and the decision documents concerning the site. The two repositories are the Joliet Public Library and the Three Rivers Public Library in Channahon. In July 1995, a Community Relations Plan was developed and implemented by the Illinois EPA.

In accordance with section 117 of the Comprehensive Environmental Response Compensation and Liability Act of 1980 ("CERCLA"), as amended by the Superfund Amendments and Reauthorization Act of 1986 ("SARA") (commonly and collectively known as "Superfund"), 42 U. S. C. § 9617 and pursuant to the Illinois EPA's "Procedures for Informational and Quasi-Legislative Public Hearings" 35 Ill. Adm. Code 164, the Illinois EPA held a public hearing on January 12, 1999, and a public comment period from December 10, 1998, through February 11, 1999, to present the preferred remedy and the Proposed Plan ("PP") and to allow people the opportunity to comment on the final remedy for the landfill operable unit at the Amoco Chemicals (Joliet Landfill) Superfund Site. Questions and comments received during the public comment period are listed and addressed in the Responsiveness Summary which is Appendix C in this document.

V. Scope and Role of the Response Action

Two operable units have been identified at this site -- one for the landfills and the other for the contaminated groundwater. The remedial response objectives for the site are based on exposure levels and associated risks posed by contamination within the landfills. The groundwater operable unit will be evaluated under a separate feasibility study, PP, and Record of Decision ("ROD").

Under the landfill operable unit, a Resource Conservation and Recovery Act ("RCRA") cap will be placed on both landfills and a new leachate collection system will be installed along the down gradient side of the south landfill and at the southern end of the north landfill in the location of historical leachate seepage. Down gradient groundwater is contaminated by landfill constituents. The purpose of the new low permeability cap and leachate collection system is to control the landfills as a source of groundwater contamination by reducing infiltration of precipitation through the landfill wastes and by reducing the amount of untreated leachate migrating off site.

The primary source of groundwater contamination is the landfill area. The potential exists for groundwater migration from the shallow contaminated aquifer system downward into the lower aquifer via fractures and faults in the landfill and plant area. Groundwater from these hydrostratigraphic units ("HSU") flows toward the Des Plaines River to the east of the site (see Figures 7, 8, & 9). There are currently no water supply wells between the landfill and the river, so there is no potential for exposure to contaminated groundwater via a water supply well. While there are some local groundwater hot spots for organic constituents in the plant area, the contribution to the overall groundwater plume from these hot spots is small when compared to the landfill contribution. The exception to this is for xylene contamination, which has been documented to originate from the southeastern corner of the manufacturing area and flows under the landfill area.

Plant wastes that were disposed in the landfill may migrate into the groundwater by various means. Precipitation may infiltrate the landfill cover and mobilize contaminants as it percolates downward into the shallow groundwater beneath the landfill. Wastes at the bottom of the unlined landfill may come into contact with groundwater during high water table events or in areas of deep excavation and dissolve into the groundwater continuously over time. Either way, the landfill as it currently exists provides a continuing source of contamination to the groundwater. Because no sampling of the landfill wastes was conducted during the RI and because there is evidence that some hazardous wastes were disposed in the landfills, all landfill contents were assumed to be hazardous wastes, as defined by RCRA.

The soil gas survey conducted during the RI detected low levels of volatile organics, primarily xylene, under the landfill cover (see Figure 5). There is no gas collection system for the landfills.

Soil borings were drilled adjacent to the landfill (see Figure 4) to determine the potential for migration of landfill contaminants via windborne transport or surface water runoff. Surface soil samples did exhibit elevated levels of several metals (lead, arsenic, chromium) which exceed risk guidelines. Polychlorinated Biphenyls ("PCBs") were also detected at levels less than ten milligrams per kilogram ("mg/kg") in surficial soils.

The subsurface soil samples collected at the boring locations showed an increase in the site specific organic acids with depth. Arsenic was present at concentrations similar to those found in the surface soils. The concentrations of acids in the borings do not indicate that these soils are a significant source of organic acid contamination for the groundwater. PCBs were detected at less than one milligram per kilogram ("mg/kg") in the subsurface soils.

Several leachate seep locations were sampled. Liquids and surface sediments from the seep locations were analyzed. The seep liquid samples contained low concentrations of benzene (consistent with levels in HSU1) and relatively low levels of organic acids. The metals present in the liquid seep samples that are elevated above the 35 Ill. Adm. Code 620 Class 1 groundwater standards are consistent with those that exceed the standard in HSU1 and HSU2. The levels of metals detected in the seeps is typically less than the highest HSU1 values. The seep sediments contained only low concentrations of organic acids and PCBs, however, several of the metals were detected at levels two to ten times greater than those found in the surface soil samples adjacent to the landfill.

VI. Site Characteristics

A. Land Use

The landfill is located on a bluff about 600 feet west and northwest and overlooking the Des Plaines River about 60 feet below. Moving toward the east from the landfill there is a 25-30 foot steep drop in elevation and then the land slopes to the River. The River is generally at about 500 feet mean sea level ("msl"), the 100 year flood plain is at 513 feet msl, and the landfill is between 565 and 570 feet msl elevation.

The landfill is located within an industrial use area, currently zoned as intensive industrial with adjacent farm fields and rural residential land use. The landfill has monitored access through the manufacturing facility's security system, although there is the potential for access from the river and the south gate (which borders private property).

B. Groundwater Quality

The shallow aquifer system beneath the site consists of two hydrostratigraphic units; unconsolidated glacial deposits, denoted by HSU1 (see Figure 7), and shallow limestone and dolomite bedrock formations, denoted by HSU2 (see Figure 9). Both are in hydraulic communication under portions of the landfill. HSU1 has a groundwater divide on the western edge of the landfill. The upper portion of the shallow dolomite/limestone hydrostratigraphic unit (HSU2) beneath the site is highly fractured with dissolution and mineralization features present at depth. A third hydrostratigraphic unit (HSU3, comprising the Scales Shale or Brainard Shale formations) beneath the site forms a regional and local aquitard between the shallow aquifer system and the deeper bedrock aquifers. These aquitards are disrupted by faulting associated with the Sandwich Fault Zone in the site area. Specifically, in the south area of the landfill the aquitards are found at different elevations. Below HSU 3 is the regional deep aquifer referred to as the Galena-Platteville-Glenwood-St. Peter Aquifer. BP Amoco's manufacturing facility uses water supplied from production wells completed in this deep aquifer.

Portions of the landfill overlie the Sandwich Fault Zone. Faults within this zone have displaced the shallow bedrock formations such that the shallow bedrock north of the fault zone comprises Ordovician age limestone and to the south, the shallow bedrock comprises younger Silurian age dolomite. Bedrock formations are covered by unconsolidated glacial deposits. As a result of the fault, in the north portion of the site the Scales Shale is found at shallow depths (less than 50 feet) and forms the bottom of the shallow aquifer. In the south portion of the site where the Sandwich Fault has displaced the Scales Shale, the Brainard Shale is found at depths of approximately 100 -120 feet. The Brainard Shale forms the bottom of the shallow aquifer in the south area of the site.

The groundwater in HSU1 and in HSU2 has been contaminated by landfill related contaminants (see Tables 3a & 3b). Figure 3 contains the monitoring well locations. The depth of contamination of site groundwater below the upper-most weathered and fractured portions of the Silurian dolomite formations is unknown due to lack of monitoring well data. In general, the highest concentrations of contaminants are detected directly adjacent to the landfill boundaries by monitoring wells completed within the shallow glacial deposits of HSU1.

The highest total concentrations of inorganic contaminants, including iron, manganese, cobalt, lead, cadmium, zinc and arsenic were generally detected in HSU1 adjacent to the east boundary of the landfill and near the bluff area. The source of these inorganic contaminants include releases from the landfill, and potentially some localized hot spots within the plant area.

Concentrations of organic contaminants in samples collected from monitoring wells located approximately 150 to 200 feet from the Des Plaines River and screened in HSU2 (MW-65-89, MW-66-89, MW-67-89, and MW-68-89) were non-detect or near detection levels in both rounds of RI sampling.

Concentrations of contaminants down gradient of the subsurface collection system in the northern portion of the site, as indicated by MW-63R-94, are generally reduced from concentrations upgradient of the subsurface collection system. This groundwater quality data indicates that the subsurface collection system may be effective in reducing the concentrations of landfill related contaminants within the zone monitored as groundwater flows toward the Des Plaines River from the BP Amoco manufacturing facility area and/or the northern portion of the landfill.

Currently, there are seven residences using groundwater within one mile of the landfill. Based on groundwater flow direction, the wells are not expected to be affected by the landfills. One additional well is located less than one mile southeast of the landfill on the opposite side of the Des Plaines River. The well appears to be located on Stepan Chemical property, which is not a residential location.

C. Leachate Seep and Surface Soil Quality

Contaminants were detected in three seeps located down gradient of the landfill (see Table 5). Two of the seeps are located upgradient of the subsurface collection system and one is located on the down gradient side of the system (see Figure 6). Water samples collected from the two upgradient seeps indicated concentrations of inorganic contaminants similar to samples collected in nearby monitoring wells completed in HSU1. Concentrations of organic contaminants detected at the upgradient seeps were generally lower than those detected in the nearby shallow monitoring wells located adjacent to and down gradient of the landfill. Contaminants were detected in the seep located down gradient and east of the subsurface collection system.

Surface soil samples collected at the seep locations detected the presence of inorganic contaminants at levels greater than surface soil concentration. Concentrations of some inorganic contaminants in the seep surface soil samples exceeded soil remediation objectives. Table 1 contains the surface soil sampling results.

D. Soil Quality

Four soil borings were advanced and sampled along the east boundary of the landfill, one boring was located between the landfill and the surface impoundments, and one was located at a remote location. Inorganic contaminants detected in the remote location were found at concentrations generally within the range of regional conditions for natural soils. However, this soil boring location was affected by organic acid contamination and does not represent background for the site. Soil samples collected from borings advanced near the landfill boundary indicated the presence of inorganic contaminants in subsurface soils. The most frequently detected inorganic contaminants include arsenic, cobalt, and iron. The soil boring with the most detections of inorganic contaminants at generally the highest concentrations is located at the northeast corner of the landfill in an area where surface soils were observed to be stained and associated with construction debris outside the landfill limits.

Soil samples collected from borings advanced near the landfill boundary contained detectable concentrations of several contaminants (see Tables 2a & 2b). Organic acids were detected in deeper samples collected at locations to the east of the landfill. PCBs at parts per million concentrations were measured generally in the shallow soil samples collected along the east side of the landfill where construction debris was located outside the landfill limits. The most detections of organic contaminants were observed in the northeast area of the landfill in generally the shallow (less than five feet) soil samples. The exception is the presence of organic acids at depth in some areas, which may reflect groundwater contamination from historical high water table conditions.

E. Landfill Soil Gas

Soil gas samples collected within the limits of the landfill detected benzene, toluene and other volatile organic compounds beneath the landfill cover. The soil gas samples were collected from depths of three to four feet below grade and indicated a wide range of concentrations of individual compounds, from 0.001 parts per billion for chloroform to 890 parts per billion for xylenes. Figure 5 has the soil gas sampling locations.

VII. Summary of Site Risks

The February 1998, Baseline Human Health and Ecological Risk Assessment ("BRA") presents human health and ecological baseline risk assessments for the site. Both assessments use site-related chemical concentrations, exposure potential, and toxicity information to characterize potential risks to human health and to local flora and fauna associated with releases of chemicals in wastes disposed in the landfills. The BRA was performed by the Illinois EPA using the methodology and techniques provided by the most current U.S. EPA risk assessment guidance. The risks are estimated assuming no further remedial actions at the site, and are intended to assist the risk manager in determining the need for and extent of any additional site remediation. The following briefly summarizes the major findings of the risk assessment for the site. The BRA should be consulted for a more detailed description of the assessment.

The BRA analyzes the toxicity and degree of hazard posed by substances related to the site and describes the routes by which these substances could come into contact with humans and the environment. Separate calculations are made for those compounds that can cause cancer and for those that can have other health effects. For the compounds that can cause cancer (carcinogens) risks are estimated as the additional possibility of developing cancer due to a lifetime of exposure to the compounds. The National Oil and Hazardous Substances Pollution Contingency Plan ("NCP") establishes acceptable levels of risk for Superfund facilities ranging from 1 in 10,000 ($1x10^{-4}$) to 1 in 1,000,000 ($1x10^{-6}$) excess cancer cases. "Excess" means the number of cancer cases in addition to those that would ordinarily occur in a population of that size under natural conditions. For the non-cancer causing compounds (non-carcinogens), a risk number called the hazard index ("HI") is calculated. Typically, hazard indices less than or equal to one (also referred to as unity) indicate no adverse health effects while indices greater than one are indicative of possible adverse health effects.

Contaminants of concern for the site are organic compounds of benzene, toluene, ethylbenzene, xylene, phenol, TMA, terephthalic acid, benzoic acid, PIA, phthalic acid, MA, naphthalene, and inorganic compounds of arsenic, cadmium, lead, iron, zinc, cobalt, manganese and chromium. These contaminants have been detected in surface soils, groundwater, leachate seep soils, surface water and in the subsurface collection system sump at the site. The contaminants detected at the site are consistent with those that were documented in disposal records and spill reports for the facility.

Receptors could, in theory, be exposed to contaminants from the landfills via one or more of the following complete exposure pathways: ingestion of contaminated groundwater, dermal contact with contaminated groundwater, inhalation of volatile contaminants during the domestic use of groundwater, incidental ingestion of contaminated surface water in seeps and the Des Plaines River, and incidental ingestion of sediment in seeps and the Des Plaines River.

Tables 6, 7, 8, and 9 show the calculated incremental lifetime cancer risks and total hazard indices for the scenarios listed above.

A. Ingestion of Groundwater

For groundwater, two groups of chemicals are evaluated separately, pesticides whose occurrence is restricted to a relatively small area and other chemicals that have a more general, site-wide distribution. Pesticides have only been detected along the northern boundary of the landfill in a few wells. Exposure point concentrations for these chemicals were therefore calculated on a well by well basis and risks are presented in the same manner. Adding risks associated with pesticides to risks from other chemicals in groundwater is only appropriate for limited areas where pesticides have been detected. Total risks are therefore presented without inclusion of risks from pesticides.

A risk of 4.4×10^{-3} is estimated for ingestion of chemicals in groundwater, not including pesticides. If pesticides are included, the total risk for the pathway might increase slightly to 4.5×10^{-3}. Such risks would be applicable to the areas near MW-43-88 where dieldrin risks are estimated to be about 6×10^{-5}, and near MW-64-89 where delta-BHC risks are estimated to be about 5×10^{-3}. Neither of these wells is located in an area likely to be developed for residential use, suggesting that risks due to exposure to pesticides might only be realized if contaminants spread down gradient. For other wells where pesticides were detected, total cancer risks are less that 1×10^{-5}. Cancer risks are, therefore, not increased significantly when pesticides in such wells are included in the total.

Arsenic contributes more than 90 percent of risks due to ingestion of groundwater. Beryllium related risks (1.6×10^{-4}) also exceed the 10^{-6} to 10^{-4} risk range. According to BP Amoco, neither arsenic nor beryllium were used in the chemical processes at the facility, and reports of materials disposed in the landfill do not include either element.

All chemicals of potential concern ("COPCs") other than arsenic and beryllium, including the pesticides, have associated risks below or within the acceptable range. In fact, the next highest risk (6×10^{-5}) is associated with exposure to dieldrin at well MW-43-88. Arsenic and beryllium, therefore, are the cancer risk drivers for groundwater at the site. The total risk from ingestion of groundwater is 4×10^{-3} without including the pesticides. Groundwater ingestion contributes almost 100 percent to total carcinogenic risks. Total carcinogenic risks exceed U.S. EPA's acceptable risk range by more than an order of magnitude. Table 4 contains preliminary groundwater remediation goals for the COPCs.

For the groundwater ingestion pathway, the following HIs are estimated: 0 for cardiovascular and hematopoietic toxicity, $1.4x10^{+3}$ for neurotoxicity, $7.9x10^{-1}$ for immune system toxicity, $7.9x10^{+2}$ for renal toxicity, $5.6x10^{-2}$ for gastrointestinal and hepatotoxicity, and $6.2x10^{-2}$ for reproductive toxicity. HIs for neural and renal toxicity exceed unity. The HI for neurotoxicity is predominantly (89 percent) from exposure to manganese and the HI for renal toxicity is almost 100 percent due to the carboxylic acids, with isophthalic and phthalic acids being the greatest contributors.

B. Incidental Ingestion of Leachate Seep Surface Water

Several small wetland areas (average size about 1,000 square feet) are located along the eastern/southeastern edge of the landfill at the bottom of a steep embankment which drops to the bench areas. These wetlands are depressions where water collects during precipitation events, and where some discharge of leachate and groundwater occurs. Wetland areas could be frequented by recreational visitors, but they would be trespassing on BP Amoco property. The area is likely to attract birds, insects and other type of animals. This may make the areas appealing to visitors, including children. Currently, access to the wetland areas is limited, since all are located on Amoco owned property. Significant access to these areas is expected only in the future if the BP Amoco operations cease, and the land is released for other purposes.

Three carcinogens were selected as COPCs for surface water in the leachate seep areas: Aroclor 1248, benzene, and arsenic. Estimated carcinogenic risks for incidental ingestion of these chemicals in surface water range from $1.7x10^{-10}$ for benzene to $1.7x10^{-7}$ for arsenic, and the total cancer risk for the pathway is $1.8x10^{-7}$. Risks for individual chemicals and total pathway risks are below the U.S. EPA's (1990) acceptable risk range.

The HI for incidental ingestion of surface water in the wetlands areas by recreational visitors is $1.0x10^{-2}$, a value two orders of magnitude less than the target HI of one.

Therefore, there are no excess cancer risks or adverse health effects expected from the incidental ingestion of leachate seep surface water.

C. Incidental Ingestion of Sediment

For incidental ingestion of sediment in the wetland areas by recreational visitors, carcinogenic risks of $3.2x10^{-7}$ and $2.0x10^{-6}$ have been estimated for Aroclor 1248 and arsenic, respectively. The total carcinogenic risk for this pathway is $2.3x10^{-6}$. This risk is at the bottom of the acceptable range.

Total carcinogenic risk for recreational visitors from incidental ingestion of surface water and sediment in wetland areas near the site is $2x10^{-6}$. This risk is an upper range estimate based on reasonable maximum exposure ("RME"). Best estimates of risks to recreational visitors to the wetland areas would be much lower. Approximately 93 percent of this risk is from incidental ingestion of sediment and only seven percent is from ingestion of surface water. Total carcinogenic risks are at the low end of the U.S. EPA's acceptable range.

The HI for incidental ingestion of sediment (soils in the wetlands areas) by recreational visitors is 1.3×10^{-1}. This low value again suggests no significant potential for non-cancer health effects via exposures from this pathway. The HI for recreational visitors for combined exposures from incidental ingestion of sediment and incidental ingestion of surface water is 1×10^{-1}. No adverse health effects are suggested by this low estimate of HI. Since hazard quotients for individual chemicals represent an upper range estimate of potential risks, remediation may not be necessary to protect recreational visitors from exposure in wetlands areas.

D. Dermal Contact with Groundwater

Dermal contact with chemicals in groundwater is associated with a risk of 5.6×10^{-7}. This risk is below the acceptable range.

For dermal contact with contaminated groundwater the following HIs have been estimated: 2.3×10^{-1} for neurotoxicity, 7.3×10^{-3} for renal toxicity, 9.0×10^{-3} for gastrointestinal and hepatotoxicity, and 1.8×10^{-2} for reproductive toxicity. Dermal contact with groundwater is not likely to have any effects on the cardiovascular, hematopoietic, and immune systems, and estimated HIs are zero. For dermal contact, none of the HIs exceed unity, suggesting that adverse non-cancer health effects are not likely from dermal contact with groundwater. It should be noted that the HI for neurotoxicity is based on 1,2,4-trimethylbenzene, which is a tentatively identified compound.

The total risk from dermal contact with groundwater, and inhalation of volatile chemicals during domestic groundwater use is 4×10^{-3} without including the pesticides. In limited areas, risks from pesticides may be approximately 1×10^{-4}, near wells where aldrin, dieldrin, and delta-BHC have been detected. However, adding risks from exposure to pesticides does not significantly increase total carcinogenic risks for future off-site residents. Groundwater ingestion contributes almost 100 percent to total carcinogenic risks.

Since metals are poorly absorbed via the skin, dermal contact with groundwater is not evaluated for these chemicals. Dermal absorption may also be inefficient for some of the semi-volatile COPCs for groundwater, especially the organic acids. These chemicals are therefore not included in the quantitative analysis. Uncertainties associated with lack of evaluation of dermal exposures for semi-volatile chemicals are discussed in the BRA.

E. Inhalation of Volatile Chemicals during Domestic Use of Groundwater

For this exposure pathway risks of 4.6×10^{-8} and 1.1×10^{-6} have been estimated for methylene chloride and benzene, respectively. The pathway risk is 1.1×10^{-6}. This risk is at the low end of the acceptable range.

Estimated HIs for inhalation of volatiles during domestic use of groundwater are 1.8×10^{-1} for neurotoxicity, 6.0×10^{-2} for renal toxicity, 8.7×10^{-2} for gastrointestinal and hepatotoxicity, 8.7×10^{-2} for reproductive toxicity, and 2.4×10^{-2} for respiratory toxicity. Non-carcinogenic health effects on the cardiovascular, hematopoietic and immune systems are not expected for this pathway and the estimated HIs are 0. All HIs for this pathway are therefore less than one.

Only volatile COPCs are included in quantitative evaluation of potential exposures from inhalation of chemicals that may volatilize during domestic use of groundwater. For semi-volatile COPCs, a quantitative evaluation was not conducted. The extent of semi-volatile absorption into the skin in not well understood.

F. Risks Associated with Exposure to Lead

Risks from exposure to lead can not be assessed using standard methods, because toxicological criteria for lead are not available. The U.S. EPA's position is that current data are insufficient to determine a Reference Dose or Reference Concentration for lead. Further, the U.S. EPA feels that the primary threat to human health from exposure to lead is subtle neurological effects in young children. For this reason, the U.S. EPA has not derived a cancer slope factor for lead, despite the chemical's Group B2 status as a probable human carcinogen.

The best available quantitative tool for evaluating health effects from exposure to lead is the Integrated Exposure Uptake Biokinetic ("IEUBK") model (U.S. EPA 1994b). This model uses current information on the uptake of lead following exposure from different routes, the distribution of lead among various internal body compartments, and the excretion of lead, to predict impacts of lead exposure on blood lead concentrations in young children. The predicted blood lead concentrations can then be compared with target blood lead concentrations associated with subtle neurological effects in children. Because children are thought to be most susceptible to the adverse effects of lead, protection for this age group is assumed to also protect older individuals. Protection of young children is considered achieved when the model predicts that less than five percent of children will have blood lead levels greater than ten micrograms per deciliter ("µg/dL") (U.S. EPA 1994c).

The IEUBK model (Version 0.99d) was used to evaluate potential risks from exposure to lead associated with the site. Young children who may live hydraulically down gradient from the site in the future are evaluated for potential exposures to lead in groundwater. One- to 84-month-old children were evaluated.

The average exposure point concentration for lead in groundwater is used as input parameter for the IEUBK model. Average exposure point concentrations are considered more appropriate for use in the IEUBK model than RME exposure point concentrations. The average exposure point concentration for lead in groundwater is 27.3 micrograms per liter ("µg/L"). The default concentration for tap water in the IEUBK model is four µg/L.

A background concentration for lead in soil of 24 mg/kg was used for the site. This value is thought appropriate since (1) lead was apparently not used in the chemical processes at the Amoco facility, (2) new construction would not use lead-based paint or other materials with high lead content and (3) areas of possible future residential development are not close to highways which may have been an historical source of lead from leaded gasoline. All other input parameters, including inputs for air, dietary intake, and maternal blood contribution, are left as default values. The default values may be found in the BRA.

Using model input as described above, the IEUBK model predicts a geometric mean blood lead level of 3.6 µg/dL with 1.3 percent of children with blood lead levels above 10 µg/dL. Generally, the U.S. EPA (1994c) considers risks from exposure to lead unacceptable if more than five percent of children have blood lead levels in excess of ten. Thus, risk from lead exposure would be considered acceptable for future residents down gradient of the landfill.

G. Potential Ecological Impacts

The Ecological Risk Assessment ("ERA") is a required component of the RI process. ERAs evaluate the likelihood that adverse ecological effects may occur or are occurring at a site as a result of exposure to single or multiple chemical or physical stressors (U.S. EPA 1992a). Risks result from contact between ecological receptors and stressors that are of sufficiently long duration and of sufficient intensity to elicit adverse effects (U.S. EPA 1992a). The primary purpose of this ERA is to identify and describe actual or potential on-site conditions that can result in adverse effects to present or future ecological receptors. Table 10 is a summary of potential ecological risks associated with the site.

Leachate from the landfills has discharged to the Des Plaines River in the past. A leachate collection system currently operates to partially prevent such discharge. However, evidence exists that the leachate system is not entirely efficient, and past experience indicates that the migration pathway is complete for some inorganic constituents and phenol. Groundwater which discharges to the Des Plaines River could impact the local aquatic community. The large volume of the river is expected to rapidly dilute such discharges and limit the geographic extent of impacts. However, non-degradable contaminants (e.g., metals) might gradually accumulate in sediments in areas of discharge, making these sediments unsuitable for benthic organisms and bottom feeders.

Local impacts may also occur in areas of current leachate seeps. Small wetlands immediately upgradient of the leachate collection system, and at least one small seep on the bench slope above the river, could impact the limited communities in these areas.

Potential ecological receptors for this study are defined as plants and animals (i.e., macroinvertebrates, fish, amphibians, reptiles, birds, and mammals) that inhabit or use, or have potential to inhabit or use, the aquatic, riparian/wetland, and terrestrial habitats on or near the site. Although other organisms such as bacteria, protozoans, and fungi are essential components of aquatic and terrestrial ecosystems, potential impacts to these organisms are not fully assessed in this ERA because, in general, adequate data are unavailable for such an assessment.

Field surveys conducted by Camp Dresser and McKee and others revealed relatively diverse plant communities in the wetland areas and nearby deciduous woods. Plant diversity was limited on the landfill surface and other developed areas on-site. A fairly wide variety of animal species appear to be utilizing available habitats in the study area. For ERA purposes, the study area consists of the landfills and areas immediately adjacent to the site, especially those to the south and east that are not developed. Studies were not conducted specifically to evaluate the relative abundance or diversity of plant and animal species resident to or using the site. In general, however, observations of plants and animals on the site are used to provide a perspective of site use by potential receptors and for assessing signs of ecological stress.

No plant or animal species of special concern, including threatened, endangered, or sensitive species are likely to routinely use or exist in the study area. The U.S. Fish and Wildlife Service confirmed that there are no federally-listed threatened or endangered species in the site area (IT 1996a). In addition, the Illinois Department of Conservation indicated (based on pre-1992 data) that there are no state-listed threatened or endangered species in the region (IT 1996a). The plant and animal species listed by the Illinois Endangered Species Protection Board ("IESPB") as endangered or threatened in Will County include 46 species of plants (IESPB 1991) and 29 species of animals (IESPB 1992). State-listed animals include 14 birds, one reptile, five fish, two insects, and seven freshwater mussels.

Two fish species listed as threatened or endangered in Illinois by IESPB (1992) — river redhorse (*Moxostoma carinatum*) and greater redhorse (*Moxostoma valenciennesi*) — were collected in the Upper Illinois River Waterway in 1993-1994 (Cochran 1996). The Des Plaines River is included in the Upper Illinois River Waterway. River redhorse is listed as threatened in Illinois, and its range includes Will County (IESPB 1992). Greater redhorse is listed as endangered in Illinois, and is not listed as occurring in Will County (IESPB 1992). The recent occurrence of these two species in the Upper Illinois River Waterway suggests that they may in fact occur in the Des Plaines River, possibly near the site. Available data do not, however, confirm the occurrence of these two species of concern in the Des Plaines River in this vicinity.

For the aquatic receptors, the potential toxicity of seep water is of most concern if these waters exist undiluted in wetland areas for extended periods of time. For sump water, the primary concern is containment and prevention of migration to existing surface water bodies or into wetland areas via overflow or leakage. Aquatic biota such as sensitive aquatic plants (algae), daphnids, invertebrates, and fish may be adversely affected by direct contact and, for invertebrates and fish, ingestion of bis(2-ethylhexyl)phthalate ("BEHP"), copper, and zinc in surface water of the Des Plaines River. BEHP-related effects are unlikely because maximum detected concentrations are equal to or only very slightly above the lowest EC20 (the concentration of a COPC in water that adversely affects 20 percent of exposed test organisms) for daphnids, which are very sensitive to BEHP. Most other aquatic organisms, which are expected to be less sensitive to BEHP, are unlikely to be affected by exposures to BEHP at detected concentrations.

Copper and zinc exposure concentrations were most elevated in the downstream river sample, ST5. The limited number of samples precludes highly certain conclusions, but this finding suggests that copper- or zinc-related effects to aquatic biota may not be site-related. Effects, if they occur, are expected to be minimized by the reduced bioavailability of copper and zinc in surface water due to binding with dissolved organic carbon and calcium. If dissolved metals persist at potentially harmful concentrations, the resulting effects are likely to include mortality, reproductive effects, and growth effects for sensitive species. It is expected that the site contributes minimally to the overall impairment of the Des Plaines River water quality. Potential sediment-related impacts will be assessed in the forthcoming supplemental ERA. Site-related effects to the Des Plaines River or local aquatic biota are not expected to be ecologically significant based on limited surface water sampling.

For terrestrial receptors, sump and leachate seep water contains contaminants that may be toxic to terrestrial or semi-aquatic biota that ingest such water. This pathway is, however, considered insignificant for most terrestrial receptors because of the availability of other sources of drinking water, such as the Des Plaines River. These other relatively less contaminated waters are more likely to be preferentially consumed by terrestrial biota.

Sensitive terrestrial plants are at risk from direct contact with surface soil at soil boring location SB01 due to elevated (phytotoxic) concentrations of cadmium, chromium, cobalt, mercury, nickel, and zinc. Sensitive terrestrial plants are at risk from direct contact with surface soil at soil boring location SB02 due to elevated (phytotoxic) concentrations of chromium, cobalt, lead, and zinc. Sensitive terrestrial plants are at risk from direct contact with surface soil at soil boring locations SB03, SB04, and SB05 due to elevated (phytotoxic) concentrations of chromium, cobalt, and zinc.

Effects to sensitive plants would probably include reduced growth, germination, or reproductive success. Such effects are expected to be very localized and unlikely to result in community-level effects or other ecologically significant effects.

Terrestrial soil-dwelling animals (e.g., soil invertebrates) are at risk from direct contact with surface soils at soil boring locations SB01-SB06 due to elevated concentrations of chromium. These risks are probably not site-related and may be lower than suggested because the earthworm benchmark concentration is less than background concentrations. Terrestrial soil-dwelling animals (e.g., soil invertebrates) are at risk from direct contact with surface soils at soil boring location SB02 due to elevated concentrations of lead. Such effects may include those affecting survival, growth, or reproduction.

Terrestrial plants are at risk from direct contact with metals-contaminated surface soils at leachate seep locations 1 (Cd, Cr, Co, Se, Ti, Zn), 2 (As, Ba, Cd, Cr, Co, Hg, Ni, Se, Ti, Zn), and 3 (As, Cr, Hg, Se, Ti, Zn). Effects to sensitive plants would probably include reduced growth, germination, or reproductive success. Such effects are expected to be very localized and unlikely to result in community-level effects or other ecologically significant effects.

Terrestrial soil-dwelling animals (e.g., soil invertebrates) are at risk from direct contact with metals-contaminated surface soils at leachate seep locations 1 (Cr, Co), 2 (As, Ba, Cr, Co, Zn), and 3 (Cr). Such effects would probably include those affecting survival, growth, or reproduction. Other terrestrial animals (including reptiles, small burrowing mammals, songbirds, and carnivorous birds and mammals) may be at risk from direct contact with surface soils at soil boring location SB01 because of high PCB concentrations. The exposure potential is low, however, because of the small discrete areas apparently contaminated with PCBs. Risks are therefore expected to be quite low except for relatively immobile organisms that inhabit the localized area of contamination. Food web effects or population- or community-level effects are not expected because of the isolated area of serious PCB contamination. Other terrestrial animals (including reptiles, small burrowing mammals, songbirds, and carnivorous birds and mammals) are expected to be at low risk from direct contact with surface soils at soil boring locations SB02, SB03, SB04, SB05, and SB06 and leachate seeps 1, 2, and 3. Any risks experienced by these types of animals would be location-dependent, and would be influenced by variables such as diet, season, foraging area, and mobility of consumers and by the level of contamination of surface soil and food items. Ecologically significant exposure through ingestion of contaminated food items is considered to be unlikely because the primary COPCs detected in surface soil, with the exception of mercury and PCBs, do not bioaccumulate to a great degree.

Containment of site-related contaminants is critical to preventing ecologically significant adverse effects to local receptors. Finally, risks to aquatic receptors in the Des Plaines River from site-related contaminants (which appear non-existent or very low) must be viewed against risks from other sources because most or all of the Des Plaines River is considered ecologically impaired.

The Des Plaines River is currently considered impaired but improving with regards to water quality. Surface water data collected from the Des Plaines River in support of this ERA suggest that there are low but detectable levels of chemical contamination in the river. For example, bis(2-ethylhexyl)phthalate, copper and zinc were detected in river water at concentrations exceeding appropriate ecological benchmarks.

For protection of ecological resources, control of (1) site runoff, (2) leachate discharges to the surface (via leachate seeps), (3) sediment transport to the Des Plaines River and its associated backwaters, and (4) groundwater discharges to surface water bodies are most critical. For surface soils, exposures of vegetation to elevated COPCs should be decreased by eliminating contact with COPC-contaminated soils. The selection of the most appropriate methods for achieving remediation goals is not a risk assessment issue but is a risk management issue to be addressed in the FFS, PP, and ROD for this site.

Although the site is not listed as a historical or archeological site in Illinois, the recent discovery of more than twenty archaeological sites within and surrounding the facility requires further review by the Illinois Historic Preservation Society.

VIII. Remedial Action Objectives

The remedial response objectives for the site are based on exposure levels and associated risks posed by contamination within the landfill and by contamination that may migrate from the landfill. The results of the BRA identified the potential contaminants of concern and the affected media at the site which pose an unacceptable risk to human health and the environment.

The remedial response objectives consider:

- Site characteristics that delineate the fate and transport of contaminants and pathways of exposure;
- Human and environmental receptors; and
- The associated short and long-term human health and environmental effects.

The remedial response objectives are as follows:

- Prevent the public from incidental ingestion of and direct contact with soil/waste containing contamination in excess of federal and state soil standards or criteria, or which pose a threat to human health;
- Prevent the public from inhalation of airborne contaminants (from disturbed soil/waste) in excess of federal and state air standards or criteria, or which pose a threat to human health; and

- Prevent the further migration of contamination from the landfill that would result in degradation of groundwater or surface water to levels in excess of federal and state drinking water or water quality standards or criteria, or which poses a threat to human health or the environment, to the extent feasible and practical.

Preliminary remediation goals ("PRGs") were calculated from the results of the BRA to establish site-specific cleanup targets for use in evaluation of remedial options in the feasibility study and/or establishing criteria for monitoring and compliance since remedial options for the landfill are generally based on presumptive remedies.

PRGs are calculated for all chemicals with associated cancer risks of 1×10^{-6} or greater, or a hazard quotient of 1 or greater. PRGs for aldrin, delta-BHC and dieldrin are developed independently from those for other carcinogens. These chlorinated pesticides are found in low concentrations in only two or three wells at the site. Further, these chemicals are highly insoluble and are unlikely to move substantial distances from their current locations. Thus, wells in the bench area where residential development is considered possible are unlikely to be contaminated with pesticides in the future.

As summarized above, potentially unacceptable risks associated with chemicals released from the site are estimated only for the future use of groundwater by residents using lands between the site and the Des Plaines River. Further, only a subset of known site-related chemicals (COPCs) detected in groundwater at the site contribute significantly to estimated risks, including several organic acids, manganese, and cobalt. PRGs are calculated for all of these chemicals. Arsenic, and beryllium contribute significantly to baseline cancer risks, but the source of these constituents is not known. PRGs are, however, calculated for these chemicals based on ingestion of groundwater used as drinking water.

Cancer risks are assumed to be additive when exposure to more than one carcinogen occurs. However, PRGs do not consider co-exposure to carcinogens. Carcinogens that occur at the site occur sporadically, decreasing the chance of co-exposure. Further, only a few carcinogenic chemicals are present in groundwater at concentrations that imply cancer risks above 1×10^{-6}.

Risks associated with exposure to benzene do not contribute significantly to total cancer risks, but the risk does slightly exceed the minimum target risk of 1×10^{-6}, and benzene is a known human carcinogen. A site-specific PRG is calculated for benzene.

Pesticides are also found in groundwater in a few localized areas. These pesticides could present a cancer risk above the minimum cancer target risk of 1×10^{-6}, but the extent of such risk is limited spatially. The BRA treats pesticides separately instead of combining pesticide risks with those from other carcinogenic COPCs. Development of PRG for these chemicals follows a parallel approach.

Risks from exposure to organic acids, benzoic, isophthalic, phthalic, terephthalic and trimellitic acids, are due to potential renal toxicity and impacts to human health from co-exposure to these COPCs could be additive. Further, the organic acids, a major constituent of wastes disposed in the landfill, tend to occur together in groundwater and co-exposure is likely. PRGs for organic acids therefore are estimated assuming co-exposure to all five constituents.

Risks from exposure to cobalt and manganese are due to potential impacts on the respiratory and central nervous systems, respectively. Co-exposure to cobalt and manganese, or to either metal and the organic acids is not assumed to result in additive effects, and PRGs for cobalt and manganese are calculated without regard to co-exposure to other COPCs.

PRGs for carcinogens are calculated using the same spreadsheets used to estimate baseline risks. Using the "Goal Seek" function in EXCEL, cancer risk for exposure to individual carcinogens (arsenic, beryllium, benzene, and chlorinated pesticides) is set to 1×10^{-6}, and the corresponding concentration of chemical in groundwater is estimated. Since all calculations for risks via ingestion of groundwater are linear, the PRG for target risks of 1×10^{-5} and 1×10^{-4} are simply the PRG at a target of 1×10^{-6} times 10 and 100 respectively.

Potential inhalation and dermal exposure to COPCs during showering is not taken into account in the calculation of PRGs. Such exposures are expected to be minimal for arsenic, beryllium and the chlorinated pesticides, all of which are non-volatile and poorly absorbed through the skin. Inhalation and dermal exposure to benzene could be significant, however, the PRG calculated based on ingestion only is less than the maximum contaminant level ("MCL") for benzene. Generally, when PRGs are less than MCLs, MCLs are used as appropriate PRGs.

PRGs for noncarcinogens are calculated using the same spreadsheets used to estimate baseline risks. Using the "Goal Seek" function in EXCEL, hazard quotients for exposure to individual COPCs or groups of COPCs (arsenic, beryllium, benzene and chlorinated pesticides) are set to one, and the corresponding concentration of chemical in groundwater is estimated.

The organic acids are assessed as a group to account for co-exposure. Since five organic acids are included in the list of COPCs, the hazard quotient for each is set at 0.2. If all organic acids were present in drinking water at a concentration equal to the PRG, the total hazard index would therefore be one.

As discussed above, PRGs for cobalt and manganese are separately estimated assuming a target hazard quotient of one.

PRGs based on noncancer effects are not calculated for chemicals which also are assessed as carcinogens. PRGs based on a cancer risk of 1×10^{-6} are lower than those based on noncancer endpoints for all relevant COPCs at the site.

The PRGs for the site are presented in Table 4. The table also includes MCLs and Ill. Adm. Code Part 620, Class I groundwater standards for those COPCs for which an MCL and/or Class I standard has been developed. The Class I standard or MCL may be used in preference to PRGs developed from the BRA when risk-based PRGs are lower than the MCL and/or the Class I standard.

Note that the PRG for beryllium is based on a slope factor that has been withdrawn by the U.S. EPA since the publication of the BRA for the site.

The remedial action will be designed to prevent incidental contact, ingestion, and migration of landfill contaminants by placing a more effective barrier on the landfills thus decreasing precipitation infiltration and decreasing the chance for exposure.

IX. Summary of Alternatives

Six remedial action alternatives were evaluated in the FFS for the landfill cap operable unit at the site (see Table 11). The No Action alternative (Alternative SC-1) is a baseline for comparison to other alternatives. SARA mandates the inclusion of a No Action alternative. This section summarizes the performance of each of the remedial alternatives relative to the nine Superfund evaluation criteria in the NCP.

Each of the four alternatives requiring a new cap on the landfill(s) contains two options for cap barrier layer components. The two options are differentiated by an "A" or "B". One of the two options utilizes synthetic capping components and the second utilizes natural clays. Due to the numerous choices, the final remedial design may differ in cap components from the chosen alternative as outlined in the PP and chosen in the ROD, but the final design shall meet Applicable or Relevant and Appropriate Requirements ("ARARs") and perform equal to or greater than the chosen alternative.

Each of the alternatives is listed and discussed in greater detail below:

Alternative SC-1: No Action
Alternative SC-2: Limited Action
Alternative SC-3: Single Barrier (Solid Waste) Cap/No Leachate Management
Alternative SC-4: Double Barrier (RCRA) Cap
Alternative SC-5: Double Barrier (RCRA) Cap/Relocate South Landfill
Alternative SC-6: Single Barrier (Solid Waste) Cap/Relocate All Waste/Leachate Collection

A. Alternative SC-1: No Action

No actions would be performed under this alternative. This alternative would provide no additional protection to human health or the environment for the landfill area. Infiltration rates through the landfill cap will remain the same thus allowing contaminated groundwater within the shallow water-bearing zone to continue to migrate away from the source area. Contaminant concentrations will be potentially reduced to acceptable levels only through natural attenuation and dispersion mechanisms.

It is expected that the groundwater contamination would persist under this alternative and ARARs would not be met. Because there are no treatment options involved with this alternative, there would be no reductions in toxicity, mobility, or volume of contaminants, except through dispersion and natural attenuation mechanisms for groundwater. This alternative would be easily implementable, with no associated costs to implement.

There are no costs to implement Alternative SC-1

B. Alternative SC-2: Limited Action

This alternative, which includes the maintenance of the existing soil cover and the monitoring of surface water, groundwater, and leachate, would provide no additional protection to human health and the environment for groundwater contaminants in the landfill area. Contaminated groundwater within the shallow water-bearing zone would continue to migrate away from the area until contaminant concentrations are reduced to acceptable levels through natural attenuation and dispersion mechanisms. This alternative would not meet ARARs.

The total capital cost is estimated at $31,000.
The annual operation and maintenance ("O & M") costs are estimated to be $107,000.
The net present worth is $1,519,000.

C. Alternative SC-3: Single Barrier (Solid Waste) Cap/No Leachate Management

This alternative will place a cap that is compliant with the standards for municipal solid waste landfills over the current extent of the landfills. This alternative would not be fully protective of human health and the environment for groundwater contaminants in the landfill area. The reduction of infiltration is not sufficient for cleanup standards to be met.

Overall, this alternative would be relatively easy to implement. Costs would be lower than those associated with the less permeable double barrier/RCRA cap. Compliance with ARARs would not be attained. The cap would require a monitoring period of at least 30 years.

The cap design for this alternative would meet the standards for municipal solid waste landfills and would extend over the same area as the double barrier (RCRA) cap alternative (Alternative SC-4). Two variations of cap design are discussed herein. Alternative SC-3A consists of a synthetic cap formed of linear low density polyethylene ("LLDPE"). The barrier is comprised of a single layer, in this case, a geomembrane made of LLDPE. This cap is more permeable than a double barrier (RCRA) cap and would potentially permit more infiltration to occur at the landfill. Alternative SC-3B consists of a low permeability compacted clay cap. The clay is compacted to form a 36-inch thick barrier to infiltration.

The costs for construction, monitoring and maintenance associated with the Alternative SC-3A are:

The total capital costs are estimated at $3,484,000.
The annual O & M costs are estimated to be $96,000 excluding the costs for O & M of the existing groundwater recovery and treatment system.
The net present worth of Alternative SC-3A is $4,841,000.

The costs for construction, monitoring and maintenance associated with the Alternative SC-3B are:

The total capital costs are estimated at $5,278,000.
The annual O & M costs are estimated to be $96,000 excluding the costs for O & M of the existing groundwater recovery and treatment system.
The net present worth of Alternative SC-3B is $6,635,000.

D. Alternative SC-4: Double Barrier (RCRA) Cap

This alternative would place a cap that is compliant with the standards for hazardous waste landfills on the existing landfills. SC-4A would include a composite barrier consisting of two layers, a flexible membrane liner over a 24-inch layer of compacted clay. This alternative would be protective of human health and the environment for groundwater contaminants in the landfill area. The reduction of infiltration following construction of the RCRA cap would result in less infiltration and less migration of contaminants than the current conditions and SC-3 municipal solid waste cap. The infiltration reduction and subsequent reduction in the leachate mobilization to the groundwater will eventually reduce contaminant concentrations to acceptable levels through natural attenuation and dispersion mechanisms.

Overall, this alternative would be relatively easy to implement. Costs would be higher than those associated with Alternative SC-3, the solid waste cap. Compliance with landfill cap ARARs would be attained. Groundwater ARARs will be addressed during the groundwater operable unit portion of the project. The double barrier (RCRA) cap would require a monitoring period of at least 30 years.

The costs for construction, monitoring and maintenance associated with the Alternative SC-4A are:

The total capital costs are estimated at $5,349,000.
The annual O & M costs are estimated to be $96,000 excluding O & M costs for the existing groundwater recovery and treatment system.
The net present worth of Alternative SC-4A is $6,705,000.

A design alternative (SC-4B) is also considered which includes construction of a double barrier (RCRA) cap over the existing landfill area, similar to Alternative SC-4A, except that the 24-inch clay layer in the composite barrier would be replaced by a geocomposite clay liner ("GCL"). This material functions in a similar manner as the clay layer, providing a low permeability backup to greatly reduce potential leakage through holes in the geomembrane.

The costs for construction, monitoring and maintenance associated with the Alternative SC-4B are:

The total capital costs are estimated at $4,634,000.
The annual O & M costs are estimated to be $96,000 excluding O & M costs for the existing groundwater recovery and treatment system.
The net present worth of Alternative SC-4B is $5,990,000.

E. Alternative SC-5: Double Barrier (RCRA) Cap/Relocate South Landfill

This alternative is the same as SC-4 except that the contents of the five acre southern landfill would be incorporated into the north landfill with the new north landfill receiving a double barrier (RCRA) cap. Alternative SC-5 would be protective of human health and the environment. The reduction of infiltration following construction of the less permeable cap would result in less migration of contaminants. Relocation of the south landfill to the north landfill would potentially reduce the contact between waste and groundwater, further reducing the mobility of contaminants. Waste in the north landfill would still be in contact with groundwater.

Overall, this alternative would be moderately difficult to implement. Waste relocation would result in potential risks from the exposure of BP Amoco employees and nearby citizens to landfill related contaminants during remediation. Costs would be higher than those associated with Alternative SC-4 because the waste relocation cost is greater than the reduction in cost due to less area being capped. Compliance with landfill cap ARARs would be attained. Groundwater ARARs will be addressed during the groundwater operable unit portion of the project. The double barrier (RCRA) cap would require a monitoring period of at least 30 years.

The cap design options for this alternative are the same as for Alternative SC-4, two variations: SC-5A for compacted clay and high density polyethylene ("HDPE"); and SC-5B for GCL and HDPE. The additional component to this alternative is the excavation of the waste from the south landfill and relocation and disposal at the north landfill area. The base of the south landfill is below the water table, at least on a seasonal basis. An existing drainage system collects leachate from the south landfill and pumps it to the existing treatment facility at the BP Amoco facility.

Eliminating the direct contact of waste in the south landfill with the groundwater, along with capping of the north landfill, greatly reduces the mobility of contaminants. It does not fully eliminate the issue since the north landfill is unlined and waste may be in contact with groundwater. The excavated waste would be properly managed and covered during the relocation process to minimize the potential for exposure. The additional fill would also be used to provide more topographic relief for improved surface drainage. The area of cap to be constructed would be reduced from 26 acres to 19.5 acres.

The costs for construction, monitoring and maintenance associated with the Alternative SC-5A are:

> The total capital costs are estimated at $8,228,000.
> The annual O & M costs are estimated to be $89,000 excluding O & M for the existing groundwater recovery and treatment system.
> The net present worth of Alternative SC-5A is $9,437,000.

The costs for construction, monitoring and maintenance associated with the Alternative SC-5B are:

> The total capital costs are estimated at $7,693,000.
> The annual O & M costs are estimated to be $89,000 excluding O & M for the existing groundwater recovery and treatment system.
> The net present worth of Alternative SC-5B is $8,902,000.

F. Alternative SC-6: Single Barrier (Solid Waste) Cap/Relocate All Waste/Leachate Collection

This alternative consists of the removal of the wastes in both the north and south landfills and the relocation of that waste into a Corrective Action Management Unit ("CAMU"). The CAMU is a new landfill that is expected to be located in the area of the abandoned wastewater treatment lagoons. The lagoon area is already clay lined. A single barrier (solid waste) cap similar to that in Alternative SC-3 would be placed on the CAMU. Leachate collection with treatment at the BP Amoco wastewater treatment facility would be included. This alternative would provide a high degree of protection to human health and the environment. The combination of reduction of infiltration following construction of the single barrier (solid waste) cap and the presence of the leachate collection below the waste would reduce infiltration and eliminate any contact between waste and groundwater, thus reducing the mobility of contaminants.

Overall, this alternative would be moderately difficult to implement. Waste relocation would result in potential risks of exposure during construction. Costs would be higher than those associated with previous alternatives because the waste relocation cost is greater than the reduction in cost due to less area capped and the additional cost associated with leachate collection system construction. Compliance with ARARs would be attained. The cap would require a monitoring period of at least 30 years.

This alternative combines the single barrier (solid waste) cap variations of LLDPE (SC-6A) and compacted clay (SC-6B) with the relocation of all waste from the north landfill and the south landfill to a CAMU. The CAMU would situate the waste in a smaller footprint to reduce the extent of capping (7.2 acres versus 26 acres) and place the waste above the groundwater table. In addition, leachate collection for the entire landfill contents would be provided. This is unlike any of the other alternatives under consideration.

The costs for construction, monitoring and maintenance associated with the Alternative SC-6A are:

> The total capital costs are estimated at $19,085,000.
> The annual O & M costs are estimated to be $94,000.
> The net present worth of Alternative SC-6A is $20,636,000.

The costs for construction, monitoring and maintenance associated with the Alternative SC-6B are:

> The total capital costs are estimated at $19,553,000.
> The annual O & M costs are estimated to be $93,000.
> The net present worth of Alternative SC-6B is $20,887,000.

X. Summary of Comparative Analysis of Alternatives

The NCP requires the Illinois EPA to evaluate the alternatives based on nine criteria by which technical, economic, and practical factors associated with each alternative must be judged. The nine criteria are divided into three groups; threshold criteria, balancing criteria, and modifying criteria.

A. Threshold Criteria:

The threshold criteria relate to statutory requirements that each alternative must satisfy in order to be eligible for selection. The two threshold criteria are:

1. Overall Protection of Human Health and the Environment

Alternatives will be assessed to determine whether they can adequately protect human health and the environment, in both the short-term and long-term, from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site, by eliminating, reducing, or controlling exposures to levels established during development of remediation goals consistent with 40 C.F.R. § 300.430(e)(2)(i). Assessment of an alternative's overall degree of protection of human health and the environment draws on the assessments of other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs.

The overall protectiveness of an alternative should be evaluated based on whether it achieves adequate protection of human health and the environment, and should describe how site risks posed through each pathway being addressed by the FFS will be eliminated, reduced, or controlled through treatment, engineering, or institutional controls. The evaluation should also consider whether an alternative poses any unacceptable short-term or cross-media impacts.

2. Compliance with ARARs

The alternatives will be assessed to determine whether they attain ARARs, including federal environmental laws and state environmental or facility siting laws, or if they provide grounds for invoking one of the waivers under 40 C.F.R. § 300.430(f)(1)(ii)(C).

For ease of analysis, the following three classifications of ARARs have been considered for the detailed evaluation:

- Chemical-Specific ARARs;
- Location-Specific ARARs; and
- Action-Specific ARARs.

In addition, other criteria, advisories, and guidance may be considered if appropriate to the evaluation.

B. Balancing Criteria:

The balancing criteria are the technical criteria that are considered during the detailed analysis. The five balancing criteria are:

1. Long-Term Effectiveness and Permanence

Alternatives will be assessed for the long-term effectiveness and permanence they afford, and for the degree of certainty that they will prove successful. Factors that will be considered, as appropriate, include the following:

- Magnitude of residual risk from untreated waste or treatment residuals remaining at the conclusion of the remedial activities. The characteristics of the residuals should be considered to the degree that they remain hazardous, taking into account their volume, toxicity, mobility, and propensity to bioaccumulate.

- Adequacy and reliability of controls, such as containment systems and institutional controls, that are necessary to manage treatment residuals and untreated waste. This factor addresses in particular, the uncertainties associated with land disposal, with respect to providing long-term protection from residuals; the assessment of the potential need to replace technical components of the alternative, such as a cap, extraction wells, or treatment system; and the potential exposure pathways and risks posed should the remedial action need replacement.

2. Reduction of Toxicity, Mobility, or Volume Through Treatment

The degree to which alternatives employ recycling or treatment that reduces the toxicity, mobility, or volume of contamination shall be assessed, including how treatment is used to address the principle threats posed by the site. Factors that shall be considered, as appropriate, include the following:

- The treatment or recycling processes the alternatives employ and the materials they will treat;

- The amount of hazardous substances, pollutants, or contaminants that will be destroyed, treated, or recycled;

- The degree of expected reduction in toxicity, mobility, or volume of the waste due to treatment or recycling, and the specification of which reduction(s) are occurring;

- The degree to which the treatment is irreversible;

- The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents; and

- The degree to which treatment reduces the inherent hazards posed by principle threats at the site.

3. Short-Term Effectiveness

The short-term impacts of alternatives shall be assessed considering the following:

- Short-term risks that might be posed to the community and the facility during implementation of an alternative;
- Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures;
- Potential environmental impacts of the remedial action and the effectiveness and reliability of mitigative measures during implementation; and
- Time until protection is achieved.

4. Implementability

The ease or difficulty of implementing the alternatives shall be assessed by considering the following types of factors as appropriate:

- Technical feasibility, including technical difficulties and unknowns associated with the construction and operation of the technology; the reliability of the technology: the ease with which additional remedial actions may be undertaken: and the degree to which the effectiveness of the remedy may be monitored:
- Administrative feasibility, including activities needed to coordinate with other offices and agencies; and the ability and time required to obtain any necessary approvals and permits from other agencies (i.e. for off-site actions and wetland impacts); and
- Availability of services and materials, including the availability of adequate off-site treatment, storage capacity, and disposal capacity and services: the availability of necessary equipment and specialists, and provisions to ensure any necessary additional resources; the availability of services and materials; and the availability of prospective technologies.

5. Cost

The types of costs that will be assessed include the following:

- Capital costs, including both direct and indirect costs:

- Annual O & M costs;
- Cost of periodic replacement of system components; and
- Net present value of capital and O&M costs based on the estimated time for the remedial action to achieve ARARs.

Capital costs consist of direct (construction) and indirect (non-construction and overhead) costs. Direct costs include expenditures for the equipment, labor, and materials necessary to install remedial actions. Indirect costs include expenditures for engineering, financial, and other services that are not part of actual installation activities, but are required to complete the installation of remedial alternatives. A bid contingency of 15 percent, a scope contingency of 20 percent, and estimated costs of 15 percent for engineering and design for implementation of the alternative were included in these costs.

Annual O&M costs are post-construction costs necessary to ensure the continued effectiveness of a remedial action. Periodic replacement costs are necessary when the anticipated duration of the remediation exceeds the design life of the system component.

A present worth analysis is used to evaluate expenditures that occur over different time periods, by discounting all future costs to a common base year, usually the current year. The U.S. EPA FS guidance (U.S. EPA, 1988) suggests a maximum time frame of 30 years. Generally, the goal is to achieve ARARs within this time frame. A discount rate of seven percent was used for the present worth analysis. This allows the cost of remedial action alternatives to be compared on the basis of a single figure representing the amount of money that, if invested in the base year and disbursed as needed, would be sufficient to cover all costs associated with the remedial action over its planned life.

The total present worth costs presented in this section are estimated. These costs are prepared for comparative purposes only. The actual costs for each alternative may change upon detailed design and implementation, but the overall cost difference of one alternative relative to another should not vary significantly.

C. Modifying Criteria:

The modifying criteria are usually taken into account after public comment is received on the feasibility study report and the PP. The two modifying criteria are:

1. U.S. EPA/Support Agency Acceptance

This criteria reflects the aspects of the preferred alternative and other alternatives that the support agency favors or objects to, and any specific comments regarding State ARARs or the proposed use of waivers.

2. Community Acceptance

This criteria summarizes the public's general response to the alternatives described in the PP and in the FFS Report based on the public comments received.

D. Evaluation of Alternatives

1. Overall Protection of Human Health and the Environment

Alternatives SC-1, SC-2, and SC-3 are not fully protective of human health or the environment since they would not achieve ARARs for landfill closure nor provide a reliable means of preventing exposure to site contaminants. The contamination originating from the landfill would not be eliminated, reduced, or controlled, except through natural attenuation mechanisms. Contaminants would continue to leach to groundwater and would constitute risks to off-site human and environmental receptors at groundwater discharge locations. Human health risks associated with direct contact with contaminated groundwater would not be reduced.

Alternative SC-4 would be protective of human health and the environment because it would meet the remedial objectives of the landfill cap operable unit. While waste would be left in place, the double barrier (RCRA) cap would reduce infiltration, reduce leachate, and provide a reliable means of preventing on-site exposure to site contaminants and further groundwater contamination. The contamination itself would not be eliminated, or reduced, except through natural attenuation mechanisms.

Alternative SC-5 would be protective of human health and the environment because it would meet the cleanup goals of the landfill cap operable unit and the less permeable cap would restrict exposure to the waste material. The contamination itself would not be eliminated, or reduced, except through natural attenuation mechanisms. Waste would be in an unlined landfill and in contact with groundwater providing a continual source of contamination for perpetuity. Less waste would be in contact with groundwater and a smaller leachate/groundwater remedial system, if necessary, would be required.

Alternative SC-6 would be protective of human health and the environment because it would meet the groundwater and landfill closure ARARs and it would provide a reliable means of preventing exposure to site contaminants. This is the only remedial alternative that incorporates leachate collection for the entire landfill wastes. Also, unlike any of the other alternatives, under SC-6 landfill wastes will be consolidated, placed on a liner, and out of contact with groundwater.

2. Compliance with ARARs

Alternative SC-1 would not comply with the ARARs for remediating the landfill until contaminant concentrations are reduced to acceptable levels through natural attenuation mechanisms. Alternative SC-2 would not comply with ARARs for groundwater and surface water. Alternative SC-3 would not fully comply with the ARARs for remediating the landfill. Capping would reduce the mobility and volume of contaminants leaching to the groundwater. This alternative does not address areas where leachate is generated by waste in direct contact with groundwater.

Alternative SC-4 would comply with the ARARs for the landfill cap. Capping would reduce the volume of contaminants leaching to the groundwater. The natural attenuation would consist of leaching from soils, degradation of organics in soil and groundwater, and dispersion of inorganics in groundwater. However, the landfills would not fully be closed until the groundwater operable unit remediation is complete. This alternative does not address areas where leachate is generated by waste in direct contact with groundwater. However, the groundwater operable unit FFS will address these concerns.

Alternative SC-5 would comply with the ARARs for remediating the landfill cap. Contaminant concentrations leaching to groundwater are reduced to acceptable levels through natural attenuation mechanisms and placement of the double barrier (RCRA) cap. The natural attenuation would consist of leaching from soils, degradation of organics in soil and groundwater, and dispersion of inorganics in groundwater. However, the landfills would not fully be closed until the groundwater operable unit remediation is complete. This alternative does not fully address areas where leachate is generated by waste in direct contact with groundwater.

Alternative SC-6 achieves ARARs for groundwater and the waste material. Full closure of the landfills would be attained by this remedy.

Alternatives SC-1, SC-2, and SC-3 are not considered for further evaluation since the threshold criteria are not fulfilled.

3. Long Term Effectiveness and Permanence

Alternative SC-4 would be protective of on-site human health and the environment since the cap would provide a reliable means of preventing exposure to contaminants. Continued migration of contaminants leached to groundwater from the site should not constitute risks to off-site human and environmental receptors at groundwater discharge locations. Long-term maintenance of the final cover system is required, including mowing, repair of erosion damage and reseeding.

Alternative SC-5 would be protective of human health and the environment since it would provide a reliable means of preventing exposure to contaminants. Continued migration of contaminants leached to groundwater from the site should not constitute risks to off-site human and environmental receptors. The mobility of contaminants in waste deposited below the seasonal high water table would be greatly reduced by excavating the south landfill and placing the waste on top of the north landfill. Long-term maintenance of the final cover system is required, including mowing, repair of erosion damage and reseeding.

Alternative SC-6 would be protective of human health and the environment since it would provide a reliable means of preventing exposure to contaminants. Migration of contaminants leached to groundwater from the site would be minimized by collection in appropriate areas. Leaching of contaminants outside the zone of influence of the pumping system would decrease to acceptable levels with the reduction of infiltration related to the final cover. Additional contamination from the plant area would be diverted from the landfill source area. Long-term maintenance of the final cover system is required, including mowing, repair of erosion damage and reseeding, and operations and maintenance of the pumping system.

4. Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternative SC-4 would reduce the toxicity and volume of contaminants at the site through the leachate collection system at the south landfill and by the existing groundwater recovery and treatment system on the northern third of the north landfill. The double barrier (RCRA) cap would reduce the mobility of the contaminants due to the decrease in infiltration of precipitation into the waste. This double barrier (RCRA) cap alternative reduces infiltration by approximately 99 percent compared to the existing cap, as determined by the Hydrologic Evaluation of Landfill Performance ("HELP") model.

Because Alternative SC-5 does not include any treatment, it would not reduce the toxicity or volume of contaminants at the site, other than through natural attenuation mechanisms or by the existing groundwater recovery and treatment system on the northern third of the landfill. The mobility of the contaminants would be reduced due to the decrease in infiltration of precipitation into the waste, and greatly reduced contact with the groundwater for the south landfill. This alternative reduces infiltration by approximately 99 percent as compared with the existing cap.

Because Alternative SC-6 does include leachate collection and treatment, it would therefore reduce the toxicity and volume of contaminants at the site. The mobility of the contaminants would be reduced due to the decrease in infiltration of precipitation into the waste, contact with the groundwater being eliminated and a leachate collection system beneath the waste established. This alternative reduces infiltration by approximately 99.9 percent as compared with the existing cap.

5. Short-Term Effectiveness

In Alternative SC-4, construction of the final cover system has the potential for exposure of waste and direct contact by construction workers on-site. While only surficial regrading of the existing cover soils is intended, waste excavation is necessary for the installation of the gas vents. There is also a possibility of encountering waste during the installation of monitoring wells. The duration of exposure would be over a construction season, though the chance of direct contact by workers is minor since these issues can be adequately addressed through the contractor's health and safety procedures. The short-term effectiveness is high for this alternative since only a small amount of waste excavation is expected and the exposure duration is short. Waste exposure activities should be minimal in this alternative thus decreasing the potential exposure duration.

In Alternative SC-5, excavation of waste carries the potential for exposure to construction and manufacturing facility workers on-site, including releases to the atmosphere, which could also affect downwind residences. Waste would be excavated and relocated creating the potential for a release of landfill contaminants. Construction of the final cover system and monitoring system carries the potential for exposure of waste and direct contact by construction workers on-site. Waste excavation is necessary for the installation of the gas vents. These issues can be addressed through contractor health and safety procedures, dust control, and proper air monitoring during excavation and placement of waste from the south landfill. The potential for exposure to landfill contaminants in the short-term is moderate due to the amount of waste to be relocated.

For Alternative SC-6, excavation of waste carries the potential for exposure to workers on-site, including releases to the atmosphere, which could also affect downwind residences. Alternative SC-6 would present more risk to on-site workers than Alternative SC-5 since a greater volume of contaminated soil would be excavated as part of this alternative. Construction of the final cover system and monitoring system carries the potential for exposure of waste and direct contact by construction workers on-site. These issues can be addressed through contractor health and safety procedures, dust control, and proper air monitoring during excavation and relocation of waste. This alternative requires the most waste relocation. The potential for exposure to landfill contaminants in the short-term for Alternative SC-6 is greater than any of the other alternatives.

6. Implementability

Implementing Alternatives SC-4, SC-5, and SC-6 involves commonly used materials and construction techniques. Alternatives SC-5 and SC-6 require specialized equipment and personnel for the waste excavation process. Alternative SC-6 would prove more difficult to implement than Alternative SC-5 given the greater volume of waste to be relocated.

7. Cost

The net present worth costs range from $5,990,000 for Alternative SC-4B to $20,887,000 for Alternative SC-6B. The net present worth costs for each of the three alternatives will vary upon the final design and the potential use of synthetic cap materials versus natural cap materials (the A and B designations relate to the use of natural and synthetic capping materials).

8. U.S. EPA/Support Agency Acceptance

The U.S. EPA Region V, as the designated support agency for the project, concurs with the Illinois EPA's recommendation of Alternative SC-4 as the selected remedy for the Amoco Chemicals (Joliet Landfill) Superfund Site.

9. Community Acceptance

The public has been given the opportunity to review and comment on the RI Report, the FFS Report, and the PP for site remediation. Both a public comment period and a formal public hearing were held. The community interest in the site and the remedy was minimal with three members of the public attending the hearing. No opposing questions or comments were received by the Illinois EPA during the comment period.

BP Amoco generally supports the selected remedy.

Specific responses to questions and comments are addressed in the Responsiveness Summary which is attached to this decision summary as Appendix C.

XI. The Selected Remedy

Based on consideration of the requirements of CERCLA, the detailed analysis of the alternatives, and the public comments, both the Illinois EPA and U.S. EPA Region V have determined that Alternative SC-4, double barrier (RCRA) cap, is the most appropriate remedy for the landfill cap operable unit at the Amoco Chemicals (Joliet Landfill) Superfund Site in rural Joliet, Illinois. Alternative SC-4 is a RCRA type double barrier cap. Pre-design, post PP investigations exposed the existing leachate collection system at the south the landfill. The system is deteriorated and filled with silt. To combat these problems and to further control the leachate seeps, a new leachate collection system will be installed at the southern landfill and along the southern portion of the north landfill. Leachate will be collected and treated prior to surface discharge unless contaminant concentrations are below standards. The costs associated with the construction and operation of the new leachate collection system were not included in the estimated costs provided in the FFS and earlier in this document. New groundwater monitoring wells will be installed around the perimeter of the landfills to complement the existing monitoring wells and replace the wells that are abandoned during cap placement. Plus, restrictions regarding the usage of the capped area will be placed on the property deed.

The selected remedial alternative is the same as the preferred alternative presented in the PP developed and issued by the Illinois EPA with the addition of the new leachate collection system. Details of the components of the remedy may be altered as a result of the remedial design and field conditions encountered during pre-design field activities or during construction. The Illinois EPA will continue to provide direct oversight of the design, construction, and long-term remedial action phases and any modifications.

The selected alternative is believed to provide the best balance of trade-offs among alternatives with respect to the Superfund criteria used to evaluate remedies. Based on the information available at this time, the Illinois EPA believes the alternative will protect human health and the environment, will comply with ARARs, will be cost effective, and will utilize permanent solutions and alternate treatment technologies or resource recovery technologies to the maximum extent practicable. The waste will not be excavated to allow for treatment, but instead capped in place mostly because of the uncertainties with the landfill contents and the potential risks associated with waste handling. In-situ treatment was not considered in the FFS because of the apparent lack of mobility of the landfill wastes.

The chosen alternative includes the construction of an improved and more stringent cap over the existing landfill area. Specifically, the cap will conform to the RCRA landfill requirements in 35 Ill. Adm. Code 724. The cap profile will include a composite barrier consisting of two layers: a flexible membrane liner at least 40 millimeters in thickness over a 24-inch layer of clay compacted to $1x10^{-7}$ centimeters per second permeability. The low permeability clay layer may be replaced by a GCL that exhibits performance characteristics equal to or greater than the compacted clay layer. The layers above the barrier layers (topsoil, rooting layer, drainage layer) and below (subgrade layer) may consist of common landfill cap components and may vary based on cost, workability, and availability. At a minimum, these materials must be equivalent to the capping components as defined by the most stringent ARARs.

A generic schematic layout for a potential RCRA cap alternative is shown on Figure 12.

A system of passive vents to allow the release of vapors from the landfill waste will be installed. These vapors, produced by volatilization and/or decomposition of materials in the waste, may tend to migrate laterally after a low permeability cap is constructed. The quality of the gas emitted from the vents will be monitored semi-annually for a period of two years. If deemed necessary to protect human health and the environment, an active gas collection and treatment system will be designed and implemented.

During the first phase of the pre-design field activities (February 1999), it was determined that the existing leachate collection system in the southern landfill is shallow along the down gradient sides (approximately 18 inches deep) and partially filled with silt. And, areas of ponded leachate and surface seeps were observed on the first bench east of the south end of the north landfill. In order to alleviate these issues, a new leachate collection system will be designed and installed down gradient of the southern landfill at a sufficient lateral extent and depth to ensure the capture of the majority of the leachate escaping the landfill and a new leachate collection system will be installed down gradient of the southern portion of the north landfill near the existing culvert extending under the road to capture the historical leachate seeps in that area. Both collection systems will be designed to allow the monitoring of the quality and quantity of leachate being collected. The collection systems will discharge to the BP Amoco wastewater facility for treatment prior to discharge provided the facility is in compliance.

The pre-design field activities (February 1999) also discovered waste in a few small areas outside the perceived boundary of the landfills. Waste extends into the roadway along the landfills and in the southern end of the north landfill. The small amounts of wastes associated with these discoveries do not constitute a principle threat. Provisions will be included in the design documents to relocate the waste beneath the cap within the designed landfill boundaries.

The cap design will include surface water management features (e.g. berms, ditches, catch basins, etc.) to direct runoff away from the landfill while minimizing erosion and infiltration. Storm water management and erosion control are critical to infiltration reduction. A program for long-term maintenance and monitoring will be implemented as part of this alternative. Maintenance will include regular inspections of the landfill area, repair of any damage to structures or the soil cover, removal of excessive sediment from ditches and other areas, and mowing.

Following the completion of the landfill cap operable unit remedial action, groundwater will be monitored quarterly for a minimum of one year to determine the effectiveness of the cap. Prior to the completion of the remedial action, groundwater monitoring wells will be installed around the perimeter of the landfills in sufficient numbers and locations to complement the existing monitoring wells and replace the wells that are abandoned during cap placement. Several of these monitoring wells will be installed in a nested configuration to monitor all three water-bearing zones (shallow, intermediate, and deep).

Groundwater monitoring as part of RCRA post-closure groundwater monitoring requirements (40 C.F.R. § 265.92) will be conducted following closure of the landfills. At a minimum, the O & M Plan will include the monitoring of the groundwater wells as part of the post-closure care, the analytical parameters for testing, the monitoring frequency, the contaminant trigger levels, and the contingencies to be implemented if trigger levels are exceeded or any other problem arises. In order to avoid mobilization and additional costs, the groundwater monitoring conducted as part of the groundwater operable unit investigation may also satisfy to the extent post-closure groundwater monitoring requirements for the landfills. Pursuant to the requirements of 35 Ill. Adm. Code 724.195, a groundwater point of compliance may be established for the site.

Physical access restrictions must be maintained so that trespassing will be minimized. Signs will be placed in strategic locations to warn anyone nearing the landfilled areas about potential site hazards.

The real estate deed will be amended to include prohibition of on-site groundwater use, on-site building construction, and on-site drilling except for the purpose of remedial design, sampling, monitoring, and remedial action.

In addition, a program for monitoring the leachate seeps in the slope down gradient of the landfill will be included in the O & M plan. The surficial seeps should be eliminated as a result of the installation of the new cap and leachate collection system. However, if leachate seeps persist after the completion of the remedial action, the program should contain necessary steps to characterize the nature and extent of the seepage and should contain remedial alternatives that will curtail the seepage.

The costs for construction, monitoring and maintenance associated with the Alternative SC-4A are shown in Table 12. The costs for construction, monitoring and maintenance associated with the Alternative SC-4B are shown in Table 13. These costs do not include the upgrade of the leachate collection system at the south landfill and the addition of leachate collection at the southern end of the north landfill.

XII. Statutory Determinations

The selected remedy must satisfy the requirements of Section 121 of CERCLA to protect human health and the environment; comply with ARARs, be cost effective, utilize permanent solutions and alternate treatment technologies to the maximum extent practicable; and satisfy the preference for treatment as a principle element of the remedy.

A. Overall Protection of Human Health and the Environment

Implementation of the selected remedy will reduce and control potential risk to human health from exposure to contaminated groundwater and soils through institutional controls and monitoring. The remedy will reduce risk to within the acceptable range of 1×10^{-4} to 1×10^{-6} excess cancer risk and the hazard indices for non-carcinogens will be less than one. The selected remedy will also provide environmental protection from potential risks posed by contaminants discharging to groundwater, surface water, and the ambient air.

No unacceptable short-term risk or cross-media impacts will be caused by implementation of the selected remedy. The implementation Alternative SC-4 will be fully protective of human health and the environment because it will meet the cleanup goals.

B. Compliance with ARARs

Alternative SC-4 will comply with the capping ARARs for remediating the landfill cap operable unit. Capping will reduce the volume of contaminants leaching to the groundwater. Natural attenuation will consist of leaching from soils, degradation of organics in soil and groundwater, and dispersion of inorganics in groundwater. Groundwater ARARs will be addressed during the groundwater operable unit portion of the project.

With respect to any hazardous substances, pollutants, or contaminants that will remain, Section 121(2)(A) of CERCLA requires the selection of a remedial action which complies with legally applicable or relevant and appropriate standards, requirements, criteria or limitations. The selected remedy will comply with Federal ARARs or State ARARs where State ARARs are more stringent, as determined by U.S. EPA. No ARAR waivers will be invoked. The remedy will be implemented in compliance with applicable provisions of CERCLA and the NCP.

Only the substantive requirements of ARARs apply to on-site activities. Federal program requirements which are implemented under a delegated State program are ARARs only to the extent they include requirements not incorporated into State regulations; the State regulations are the primary ARARs.

1. Chemical Specific Requirements

Chemical-specific ARARs regulate the release to the environment of specific substances having certain chemical characteristics. Chemical-specific ARARs typically define the extent of cleanup.

a. Federal

(1) Since PCBs have been used on the facility and may be present in the landfill, 40 C.F.R. Parts 750 and 761, recently amended at Federal Register Vol. 63, No. 124, June 29, 1998, are applicable or relevant and appropriate. In this Rule, the U.S. EPA amended its rules under the Toxic Substances Control Act ("TSCA") which address the manufacture, use, cleanup, storage and disposal of PCBs.

For more ARAR information regarding the Federal programs delegated to the State of Illinois see the October 1998, Focused Feasibility Study.

b. State

(2) Air - Pollution Control Board, Illinois Administrative Code, Title 35 ("Title 35"), Subtitle B - Subchapter A, Part 201: Permits and General Provisions [Lists general provisions for new sources requiring permitting and provides exemptions from permit requirements. Delegated program in Illinois.] (Specifically, but not limited to: Part 201, Air Pollution: Prohibits air pollution in Illinois through discharge or emission of contaminants into the environment. No person shall allow modification or operation of an existing emission source without appropriate permits. Also discusses the design of effluent exhaust systems. Emission monitoring may be required. These requirements are applicable or relevant and appropriate.)

(3) Air - Pollution Control Board (Title 35), Subtitle B - Subchapter F, Part 232: Toxic Air Contaminants [Sets provisions and procedures for identifying and evaluating toxic air contaminants; exceptions are also given here. Applicable to air emissions. Delegated program in Illinois.]

(4) Air - Pollution Control Board (Title 35), Subtitle B - Subchapter L, Part 243: Air Quality Standards [Sets applicable or relevant and appropriate air quality standards and measurement methods for PM-10, particulates, sulfur oxides, carbon monoxide, nitrogen oxides, ozone and lead. Delegated program in Illinois.]

(5) Water Pollution Control Board (Title 35), Subtitle C - Part 302: Water Quality Standards [Applicable or relevant and appropriate provisions and water quality standards for general use, public and food processing water supply, secondary contact and indigenous aquatic life and Lake Michigan. Procedures for determining Water Quality Criteria are also in this Part. This is a delegated program in Illinois.]

(6) Water Pollution Control Board (Title 35), Subtitle C - Part 304: Effluent Standards [Applicable or relevant and appropriate general and temporary effluent standards including some NPDES effluent standards. This is a delegated program in Illinois.]

(7) Water Pollution Control Board (Title 35), Subtitle C - Part 309: Permits [The water quality standards and NPDES requirements are applicable or relevant and appropriate to surface discharges including, but not limited to storm water, treated leachate, and groundwater during the remedial action. This is a delegated program in Illinois.]

(8) Public Water Supplies - Pollution Control Board (Title 35), Subtitle F - Part 611: Primary Drinking Water Standards [Includes applicable or relevant and appropriate provisions of the primary drinking water standards as well as maximum contaminant levels (MCLs)/goals, and analytical requirements.]

(9) Public Water Supplies - Pollution Control Board (Title 35), Subtitle F - Part 620: Groundwater Quality [Applicable or relevant and appropriate groundwater quality standards, methods for the classification of groundwater, non-degradation provisions, and various procedures and protocols for the management and protection of groundwater.]

(10) Waste Disposal - Pollution Control Board (Title 35), Subtitle G - Subchapter C: Hazardous Waste Operating Requirements, Part 721: Identification of Listing of Hazardous Waste [This is applicable for defining, disposing, identifying, and listing hazardous waste and lists of hazardous waste. Delegated program in Illinois.]

(11) Waste Disposal - Pollution Control Board (Title 35), Subtitle G - Subchapter C: Hazardous Waste Operating Requirements, Part 728: Land Disposal Restrictions [This is applicable for soil excavation and treatment residuals if soils test TCLP hazardous and are to be moved or placed outside an area of contamination and/or are to be disposed off-site. This is a delegated program in Illinois.]

(12) Waste Disposal - Pollution Control Board (Title 35), Subtitle G - Subchapter C: Hazardous Waste Operating Requirements, Part 729: Prohibited Hazardous Wastes in Land Disposal Units [Describes applicable or relevant and appropriate general hazardous waste restrictions and restrictions on halogenated solvents and liquid hazardous wastes in landfills. This is a delegated program in Illinois.]

(13) Waste Disposal - Pollution Control Board (Title 35), Subtitle G - Subchapter I: Solid Waste and Special Waste Hauling, Part 808: Special Waste Classifications [Includes applicable or relevant and appropriate information on special waste classifications.]

2. Location-Specific Requirements

Location-specific ARARs are those requirements that relate to the geographic location of a CERCLA facility.

a. Federal

(14) National Environmental Policy Act, (42 U.S.C. §§ 4321 et seq.), 40 C.F.R. § 6, Subpart C, Coordination with other Environmental Review and Consultation Requirements, Part 6.301: Landmarks, Historical, and Archeological Sites [Applicable or relevant and appropriate requirements regarding compliance with all applicable regulations outside of NEPA for any EPA undertaking that affects a property with historic, archeological or cultural value that is listed or eligible for listing on the National Register of Historic Places.]

For more ARAR information regarding the Federal programs delegated to the State of Illinois see the October 1998, Focused Feasibility Study.

b. State

none

3. Action-specific Requirements

Action-specific ARARs are requirements that define acceptable treatment and disposal procedures for hazardous substances.

a. Federal

(15) Resource Conservation and Recovery Act, (42 U.S.C. §§ 6901 et seq.), 40 C.F.R. § 264, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities [The final site cover and access restrictions must be consistent with hazardous waste landfill closure requirements of the RCRA (Specifically, but not limited to: 40 C.F.R. §§ 264.111, 264.116, 264.117, and 264.310).]

(16) Resource Conservation and Recovery Act, (42 U.S.C. §§ 6901 et seq.), 40 C.F.R. § 268, Land Disposal Restrictions [Prohibits land disposal restrictions for specific wastes, treatment standards, and prohibitions on storage.]

For more ARAR information regarding the Federal programs delegated to the State of Illinois see the October 1998, Focused Feasibility Study.

b. State

(17) Air - Pollution Control Board (Title 35), Subtitle B - Subchapter C Emission Standards and Limitations for Stationary Sources, Part 211: Definitions and General Provisions [Applicable or relevant and appropriate definitions for emission sources and related items. Delegated program in Illinois.]

(18) Air - Pollution Control Board (Title 35), Subtitle B - Subchapter C Emission Standards and Limitations for Stationary Sources, Part 212: Visible and Particulate Matter Emissions [Applicable or relevant and appropriate requirements stating: no person shall cause or allow the emission of fugitive particulate matter from any process, including material handling, and for a variety of operations, e.g., incinerators or waste storage piles. Delegated program in Illinois.]

(19) Water Pollution Control Board (Title 35), Subtitle C - Part 304: Effluent Standards [Applicable or relevant and appropriate general and temporary effluent standards including some NPDES effluent standards. This is a delegated program in Illinois.]

(20) Public Water Supplies - Pollution Control Board (Title 35), Subtitle F - Part 620: Groundwater Quality [Applicable or relevant and appropriate groundwater quality standards, methods for the classification of groundwater, non-degradation provisions, and various procedures and protocols for the management and protection of groundwater.]

(21) Waste Disposal - Pollution Control Board (Title 35), Subtitle G - Subchapter C: Hazardous Waste Operating Requirements, Part 720: Hazardous Waste Management System: General [Applicable or relevant and appropriate definitions for terms used in hazardous waste rules and is included for purposes of clarity. This is a delegated program in Illinois.]

(22) Waste Disposal - Pollution Control Board (Title 35), Subtitle G - Subchapter C: Hazardous Waste Operating Requirements, Part 722 [Includes applicable or relevant and appropriate standards for generators of hazardous waste. This is a delegated program in Illinois.]

(23) Waste Disposal - Pollution Control Board (Title 35), Subtitle G - Subchapter C: Hazardous Waste Operating Requirements, Part 723 [Includes applicable or relevant and appropriate standards for transporters of hazardous waste. This is a delegated program in Illinois.]

(24) Waste Disposal - Pollution Control Board (Title 35), Subtitle G - Subchapter C: Hazardous Waste Operating Requirements, Part 724 [Includes applicable or relevant and appropriate standards for owners and operators of hazardous waste treatment, storage and disposal facilities. This is a delegated program in Illinois.] (Specifically, but not limited to: 35 Ill. Adm. Code 724.114, Security: Contains applicable requirements to prevent unauthorized site access through an artificial or natural barrier which completely surrounds the active portion of the facility and through controlled entry points. Signage requirements are also specified.; 724.410, Closure and Post Closure Care: Applicable final cover requirements for the landfills.)

(25) Waste Disposal - Pollution Control Board (Title 35), Subtitle G - Subchapter C: Hazardous Waste Operating Requirements, Part 725 [Includes applicable or relevant and appropriate standards for owners and operators of interim hazardous waste treatment, storage and disposal facilities. This is a delegated program in Illinois.]

(26) Waste Disposal - Pollution Control Board (Title 35), Subtitle G - Subchapter C: Hazardous Waste Operating Requirements, Part 728: Land Disposal Restrictions [Applicable or relevant and appropriate land disposal restrictions for wastes, waste specific prohibitions, treatment standards and prohibitions on storage. This is a delegated program in Illinois.]

(27) Waste Disposal - Pollution Control Board (Title 35), Subtitle G - Subchapter C: Hazardous Waste Operating Requirements, Part 729: Prohibited Hazardous Wastes in Land Disposal Units [Applicable or relevant and appropriate hazardous waste restrictions and restrictions on halogenated solvents and liquid hazardous wastes in landfills. This is a delegated program in Illinois.]

(28) Waste Disposal - Pollution Control Board (Title 35), Subtitle G - Subchapter I: Solid Waste and Special Waste Hauling, Part 807 [Applicable or relevant and appropriate information on solid waste permitting, sanitary landfills and closure and post-closure care.]

(29) Waste Disposal - Pollution Control Board (Title 35), Subtitle G - Subchapter I: Solid Waste and Special Waste Hauling, Part 808 [Applicable or relevant and appropriate information on special waste classifications.]

(30) Waste Disposal - Pollution Control Board (Title 35), Standards for New Solid Waste Landfills, Subtitle C - Putrescible and Chemical Waste Landfills, Final Cover System, Part 811 [Relevant and appropriate requirements of the final cover system at a new solid waste landfill.] (Specifically, but not limited to: 811.103, Surface Water Drainage: Runoff from disturbed areas resulting from precipitation events less than or equal to the 25-year, 24-hour precipitation event that is discharged to waters of the State shall meet the requirements for discharge by code. All surface water facilities shall be operated until final cover is placed and erosional stability is provided. Discharge structures shall be designed to have flow velocities that will not cause scoring of the natural or constructed lining of the receiving channel. Runoff from disturbed areas shall be diverted from disturbed areas, unless determined to be impractical. Diversion facilities shall be designed to prevent runoff from the 25-year, 24-hour precipitation event from entering the disturbed areas. Runoff from the undisturbed areas which becomes commingled with runoff from the disturbed areas shall be handled as runoff from the disturbed areas. Diversion structures shall be properly designed to handle flow velocities and shall be operated until final cover is placed and erosional stability is provided.; 811.109, Boundary Control: Relevant and appropriate requirements for restricted facility boundaries to prevent unauthorized site entry at all times. Signage is required at site entry.; 811.110, Closure and Written Closure Plan: A notation shall be made to notify any potential purchaser that the land has been used as a landfill and that post closure use can not disturb the final cover, liner, any other components of the containment system, or

the function of the monitoring system unless specified by post closure requirements. The final grading of the site shall be designed to compliment the surrounding topography of the proposed final land use of the area. The final configuration shall be designed to minimize the need for future maintenance. All drainage ways and swales shall be designed to pass runoff from the 100-year, 24-hour precipitation event without scoring or erosion.; 811.304, Foundation and Mass Stability Analysis: The waste disposal unit shall be designed to achieve a factor of safety against slope failure of at least: 1.5 for static conditions and 1.3 under seismic conditions. The potential for earthquake or blast induced liquefaction must be considered in the stability of the facility.; 811.307, Leachate Drainage System: The drainage system shall be designed in conjunction with the leachate collection system to operate for the design period to: Maintain a maximum head of one foot above the liner, maintain laminar flow, include a grade filter or geotextile as necessary to minimize clogging and prevent intrusion of fine material, and contain materials which are chemically resistant to the wastes and leachate expected to be produced.; 811.308, Leachate Collection System: The collection system shall be designed for the entire design period. Collection pipes shall be designed for open channel flow under specified conditions for the drainage system and with a cross-section that allows cleaning. Materials used will be chemically resistant to the leachate to be handled. The collection pipe and bedding shall be designed for the structural loads to be imposed. Collection pipes shall be constructed within a coarse gravel envelope using graded filter or geotextile as necessary to minimize clogging. The system shall contain a sufficient number of manholes and clean out risers to allow cleaning and maintenance of all pipes throughout the design period. Leachate shall be able to drain freely from the collection pipes. Sump collection is specified.; 811.309, Leachate Treatment and Disposal System: Systems must allow for the management of leachate during routine maintenance and repairs. The leachate drainage and collection system shall not be used for the purpose of storing leachate. Leachate may be discharged to an off site treatment works that meets the following requirements: all discharges of effluent must meet the requirements of 35 Ill. Adm. Code Part 309, the treatment system shall be operated by an operator certified under the requirements of 35 Ill. Adm. Code Part 312, and no more than 50 percent of the average daily influent flow can be attributed to leachate from a waste disposal facility. All discharges to a treatment works shall meet the requirements of 35 Ill. Adm. Code Part 310. Storage for five days of leachate generation shall be provided. This section also includes information regarding leachate monitoring and time of system operation.; 811.310, Landfill Gas Monitoring: Contains relevant and appropriate landfill gas monitoring requirements.; 811.311, Landfill Gas Management System: Contains relevant and appropriate landfill gas management requirements.; 811.312, Landfill Gas Processing and Disposal System: Contains relevant and appropriate landfill gas processing and disposal requirements.; 811.314, Final Cover System: Requirements for the final cover system.; 811.322, Final Slope and Stabilization: All slopes shall be designed to drain runoff away from the cover and prevent ponding. No standing water shall be allowed anywhere in or around the unit.

These are relevant and appropriate requirements.)

(31) Waste Disposal - Pollution Control Board (Title 35), Standards for Existing Landfills and Units, Part 814 [Relevant and appropriate requirements for disposal, expansion, and closure standards for existing landfill facilities.]

4. Other Requirements to be Considered

To Be Considered criteria ("TBCs") are included in the discussion of ARARs. However, TBCs are not ARARs, but they may be used to design a remedy or set cleanup levels if no ARARs address the site, or if existing ARARs do not ensure protectiveness. TBCs may include advisories and guidance.

a. Federal

(32) Occupational Safety and Health Administration ("OSHA") Standards Record keeping, Reporting and Related Regulations, 29 C.F.R. § 1904 [Establishes Record keeping and reporting requirements for an employer under OSHA.]

(33) Occupational Safety and Health Administration Standards, 29 C.F.R. § 1910 [Sets worker exposure limits to toxic and hazardous substances and prescribes the methods for determination of concentrations. Sets limits of worker exposure to noise during the performance of their duties. Sets the standards for workers conducting hazardous waste operations and emergency response.]

(34) Occupational Safety and Health Administration Standards, 29 C.F.R. Part 1926: [Specifies the type of safety equipment and procedures to be followed during remediation.]

(35) Safe Drinking Water Act (42 U. S. C. §§ 300f et seq.), Subpart F, Maximum Containment Level Goals, 40 C.F.R. §§ 141.50 - 141.51 [Establishes unenforceable clean-up goals for drinking water based on technology and health risk.]

(36) Threshold Limit Values [Consensus standards for controlling air quality in work place environments; used to assess inhalation risks for soil removal operations.]

(37) U.S. Environmental Protection Agency, RCRA Guidance Manual for Subpart G Closure and Post-Closure Standards and Subpart H Cost Estimating Requirements, January 1987 [Provides guidance on closure and post-closure standards and cost estimating requirements for hazardous waste management units.]

(38) U.S. Environmental Protection Agency, Soil Screening Guidance, December 1994

[Provides generic risk-based soil screening values for Superfund sites.]

(39) U.S. Environmental Protection Agency Region III, Risk - Based Concentration Table, Smith R., 1995 [Provides risk-based screening values for groundwater and soil concentrations.]

(40) U.S. Environmental Protection Agency, Integrated Risk Information System (IRIS), 1995 - 1996 [Provides reference doses and cancer potency slopes for calculating the hazard index or incremental cancer risk for specific site contaminants.]

(41) U.S. Environmental Protection Agency, Interim Policy for Planning and Implementing CERCLA Off-Site Response Actions, November 5, 1995 [Specifies appropriate method of off-site treatment on disposed of waste from a Superfund site.]

(42) U.S. Environmental Protection Agency, Summary Quality Criteria for Water, Office of Science and Technology, 1992 [Provides ambient water quality criteria.]

(43) U.S. Environmental Protection Agency, Quality Criteria for Water, Office of Water Regulation and Standards, U.S. EPA 440/5-86-001, 1986 [Provides ambient water quality criteria.]

(44) U.S. Environmental Protection Agency, Ambient Water Quality Criteria for Polychlorinated Biphenyls, U.S. EPA 440/5-80-068, 1980 [Provides ambient water quality criteria for PCBs.]

(45) U.S. Environmental Protection Agency, Risk Assessment Guidance for Superfund: Environmental Evaluation Manual, Volume II, Final Report, EPA/540/1-89/002, 1989 [Provides guidance for conducting ecological risk assessments.]

(46) U.S. Environmental Protection Agency, Risk Assessment Guidance for Superfund. Volume I. Human Health Evaluation Manual Supplemental Guidance. Standard Default Exposure Factors, Interim Final, March, 1991. OSWER Directive #9285.6-03, 1991 [Provides exposure factors for estimating hazard or risk in human health risk assessments.]

(47) U.S. Environmental Protection Agency, Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A, December, 1989. U.S. EPA 540/1-89/002. Office of Emergency and Remedial Response [Provides guidance on preparing a baseline human health risk assessment using the four steps, data evaluation, exposure assessment, toxicity assessment, risk characterization.]

(48) National Park Service, 48 Fed. Reg. 44716 [Provides published technical standards and

guidelines regarding archeological preservation activities and methods.]

(49) The area of remediation must comply with the Migratory Bird Treaty Act.

b. State

(50) Illinois Historic Preservation Act, (20 ILCS 3410/1 et seq.) [Provides definitions, criteria for evaluation, and procedures for adding archeological sites to the National Register of Historic Places. Details the responsibilities of and procedures to be implemented by state and local governments regarding location, identification and nomination of archeological sites for listing on the National Register of Historic Places.]

(51) Illinois Water Well Construction Code (77 Ill. Adm. Code 920) [Provides for the construction and abandonment of monitoring wells.]

(52) 35 Ill. Adm. Code 807.314(c), Solid Waste, Sanitary Landfills - Standard Requirements: Relevant and appropriate requirements for means to control site access through fencing and gates.

(53) 8 Ill. Adm. Code 650, Soil and Water Conservation Districts Act.

C. Cost Effectiveness

Cost effectiveness is determined by evaluating the overall effectiveness proportionate to costs, such that the selected remedy represents a reasonable value for the money to be spent. The estimated net present worth value of the selected remedy, Alternative SC-4, is almost three million dollars less than Alternative SC-5 which is the closest (in cost) alternative that is more expensive than SC-4. Alternative SC-4 is one third of the cost of Alternative SC-6, the most expensive Alternative SC-6. Both Alternatives SC-5 and SC-6 involve waste relocation as a major component of the remedial action which increases the potential for contaminant exposure and release. Alternative SC-4 provides a high degree of certainty that hazards posed by contamination at the site will be eliminated or reduced to within acceptable levels in a cost effective manner.

D. Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The selected remedies meet the statutory requirement to utilize permanent solutions and treatment technologies to the maximum extent practicable in a cost-effective manner. Of those alternatives that are protective of human health and the environment and comply with ARARs, the Illinois EPA and the U.S. EPA have determined that this selected remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence; reduction in toxicity, mobility, or volume achieved through excavation and removal; short term effectiveness; implementability; and cost while considering the statutory preference for treatment as a principle element and considering U.S. EPA and community acceptance.

The selected remedy provides a high degree of long-term effectiveness and permanence while minimizing the potential for exposure to site contaminants when compared to the waste relocation alternatives. The less permeable landfill cap and new leachate collection system provide contaminant containment with leachate treatment resulting in the reduced contaminant mobility and toxicity.

E. Preference for Treatment as a Principle Element

The selected remedy for the landfill cap operable unit uses treatment as a principle element of the remedy. Alternative SC-4 does include leachate collection with treatment, if necessary, at the BP Amoco wastewater treatment facility which will reduce the toxicity and volume of contaminants at the site. The mobility of the contaminants would be reduced due to the decrease in infiltration of precipitation from the double barrier (RCRA) cap into the waste. This double barrier (RCRA) cap alternative reduces infiltration by approximately 99 percent compared to the existing cap, as determined by the HELP model. The existing groundwater recovery and treatment system on the northern third of the north landfill will aid in leachate collection and treatment.

XIII. Documentation of Significant Changes

The PP for the Amoco Chemicals (Joliet Landfill) Superfund Site was issued for public comment on December 10, 1998. The PP identified Alternative SC-4 as the preferred alternative for the landfill cap operable unit. The public comment period ended February 11, 1999.

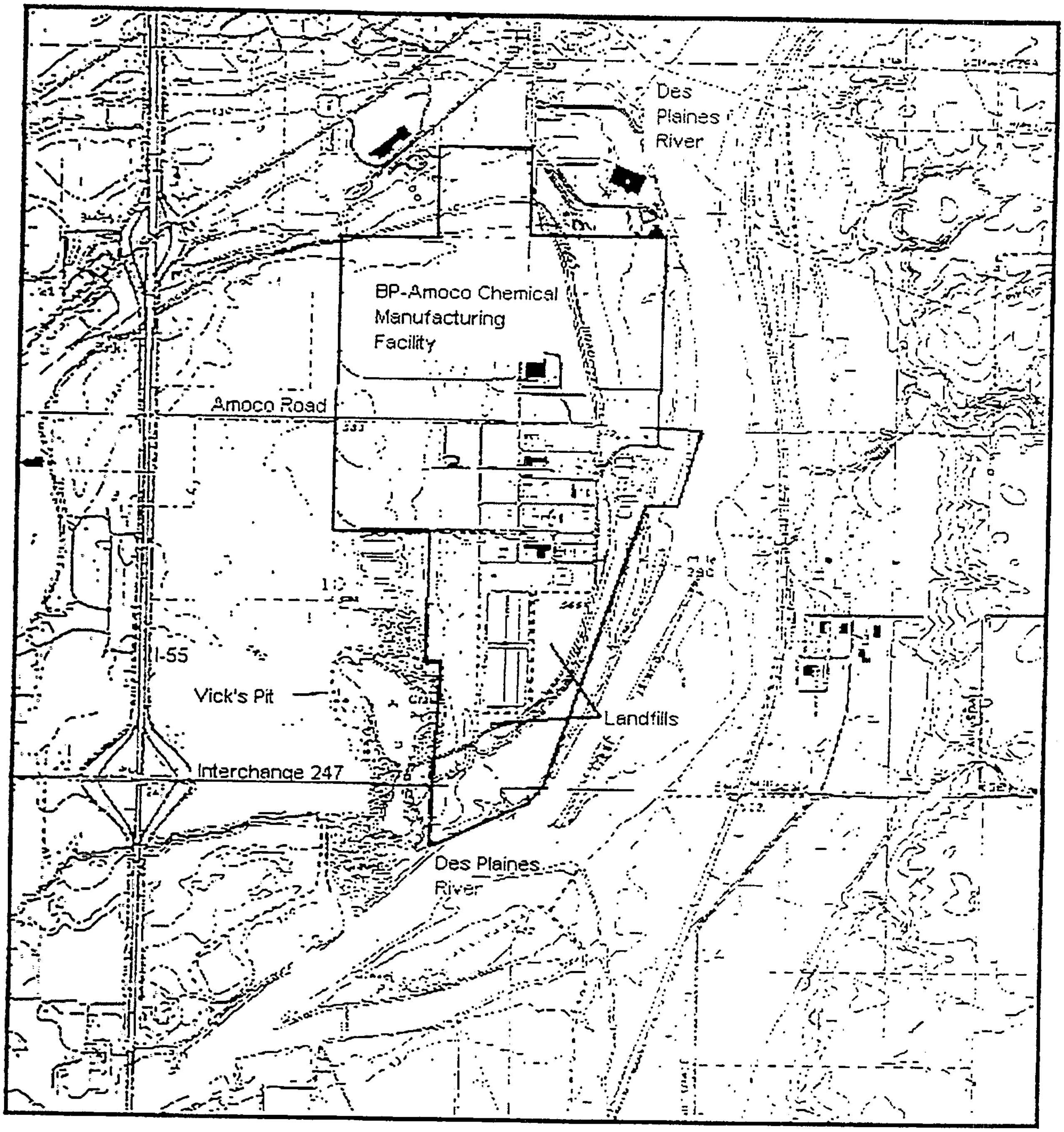
The Agency reviewed all public questions and comments presented at the January 12, 1999, public hearing and all written comments received during the public comment period (see the Responsiveness Summary in Appendix C). The Illinois EPA and the U.S. EPA determined that no significant changes to the selected remedy, as identified in the PP are necessary due to public comment. However, the pre-design field activities have determined a need for a new leachate collection system in certain areas down gradient of the landfills, as well as the need for waste relocation for a few areas adjacent to the existing perceived landfill boundaries. These pre-design discoveries did not significantly alter the remedy as explained in the PP, but instead will increase the effectiveness and protection afforded by the preferred and selected remedy, Alternative SC-4.

List of Appendices

APPENDIX A

FIGURES

LIST OF FIGURES



Not to Scale

FIGURE 1 - Site Location

BP-Amoco Chemical Company
Joliet, Illinois

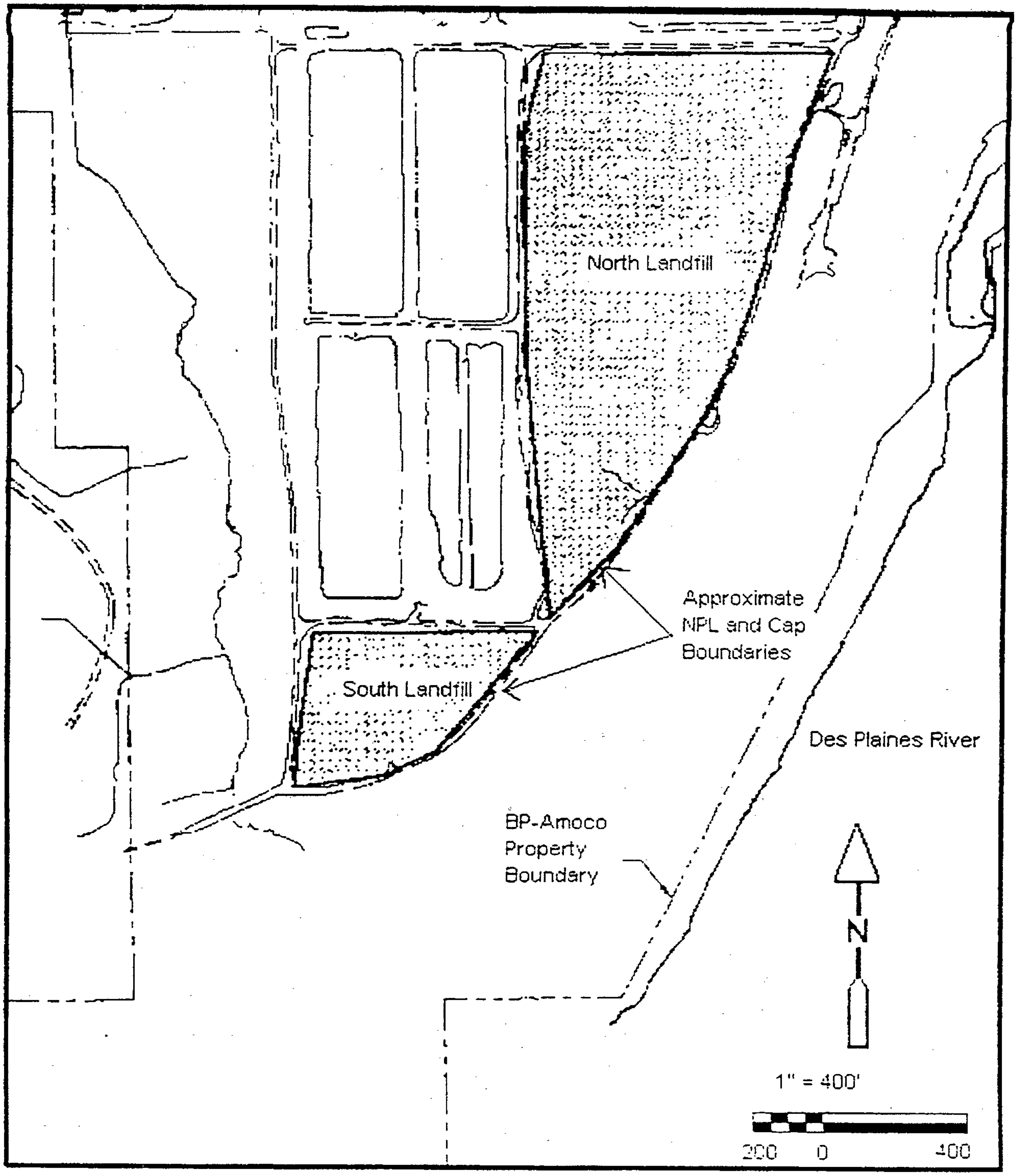


FIGURE 2 - Landfill Locations

BP-Amoco Chemical Company
Joliet, Illinois

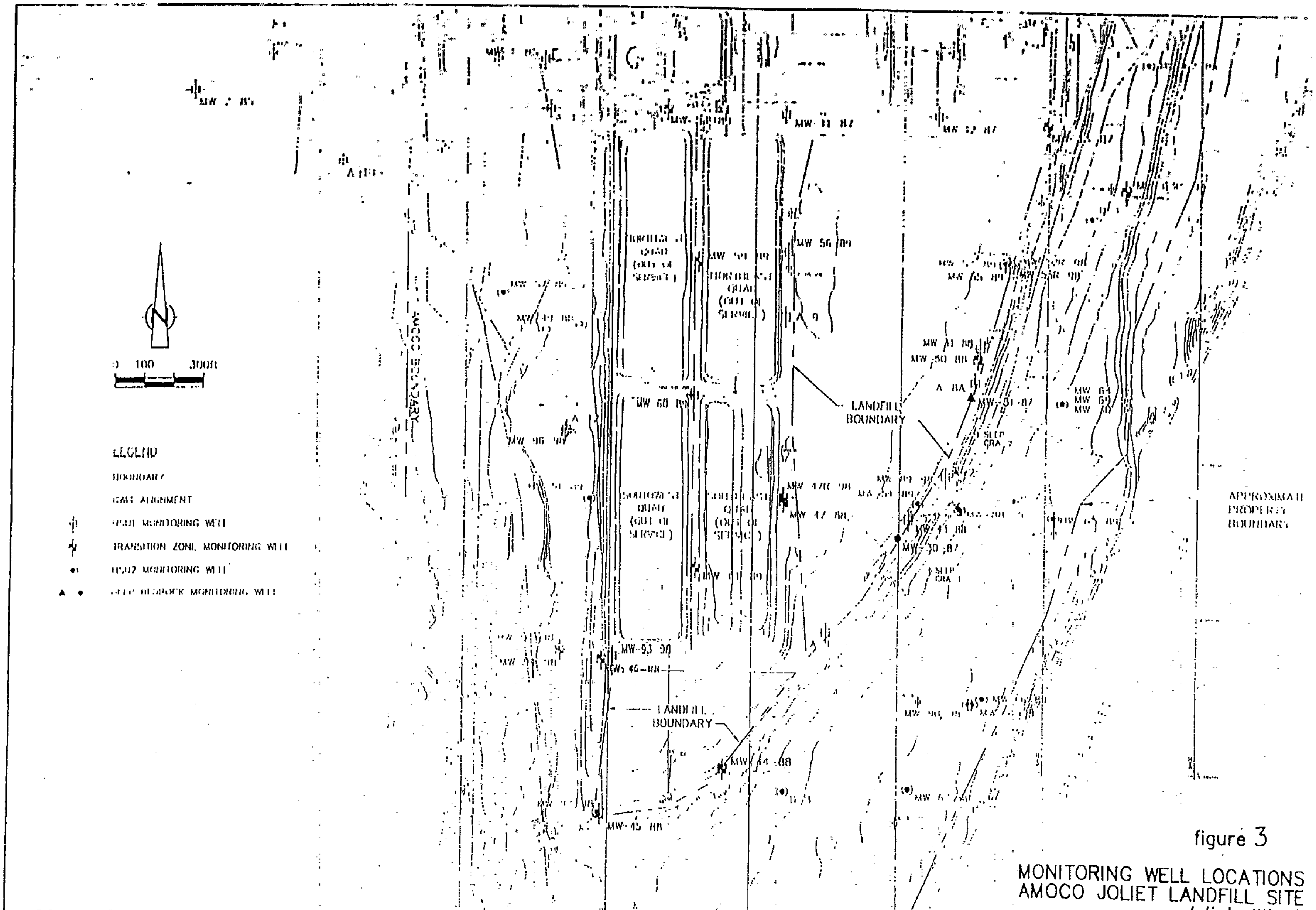


figure 3

MONITORING WELL LOCATIONS
AMOCO JOLIET LANDFILL SITE
Joliet, Illinois

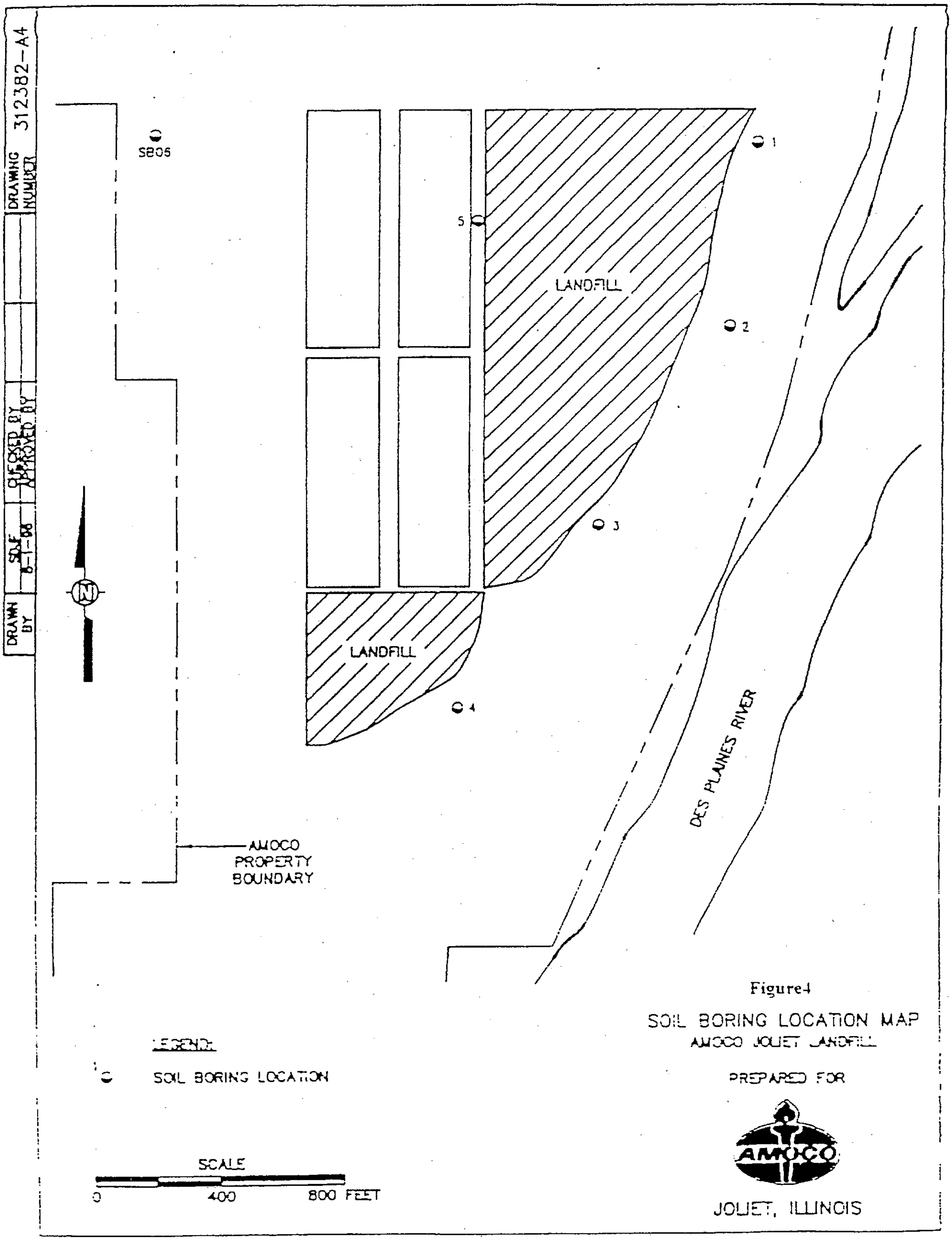
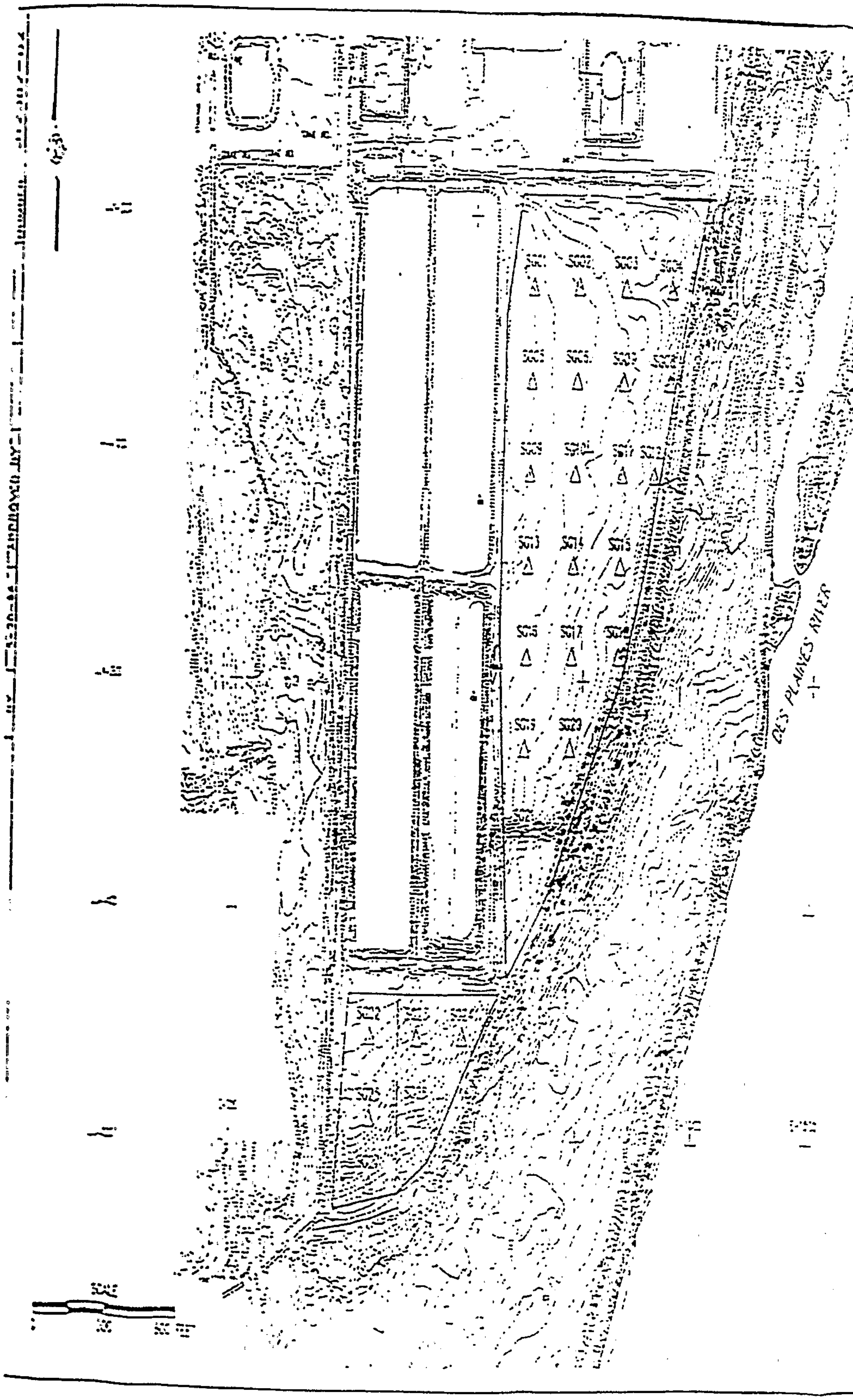


Figure 4

SOIL BORING LOCATION MAP
AMOCO JOLIET LANDFILL

PREPARED FOR

JOLIET, ILLINOIS



LEGEND

SG13 △ SOIL GAS SURVEY SAMPLING POINT LOCATION

Figure 5

SOIL GAS SURVEY
SAMPLING POINT PLAN
AMOCO JOLIET LANDFILL

AMOCO

JOLIET, ILLINOIS

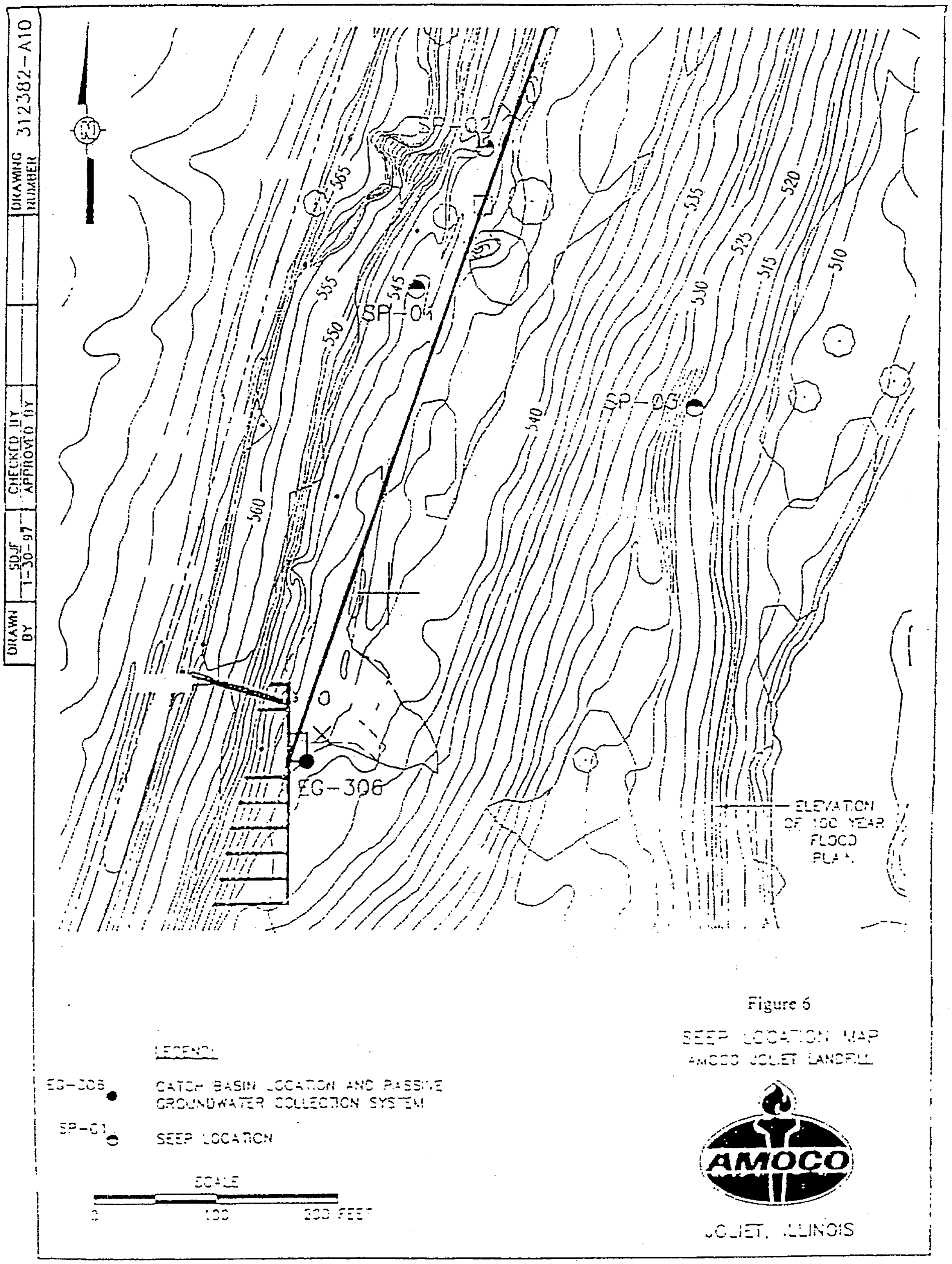


Figure 6

SEEP LOCATION MAP

AMOCO JOLIET LANDFILL

AMOCO

JOLIET, ILLINOIS

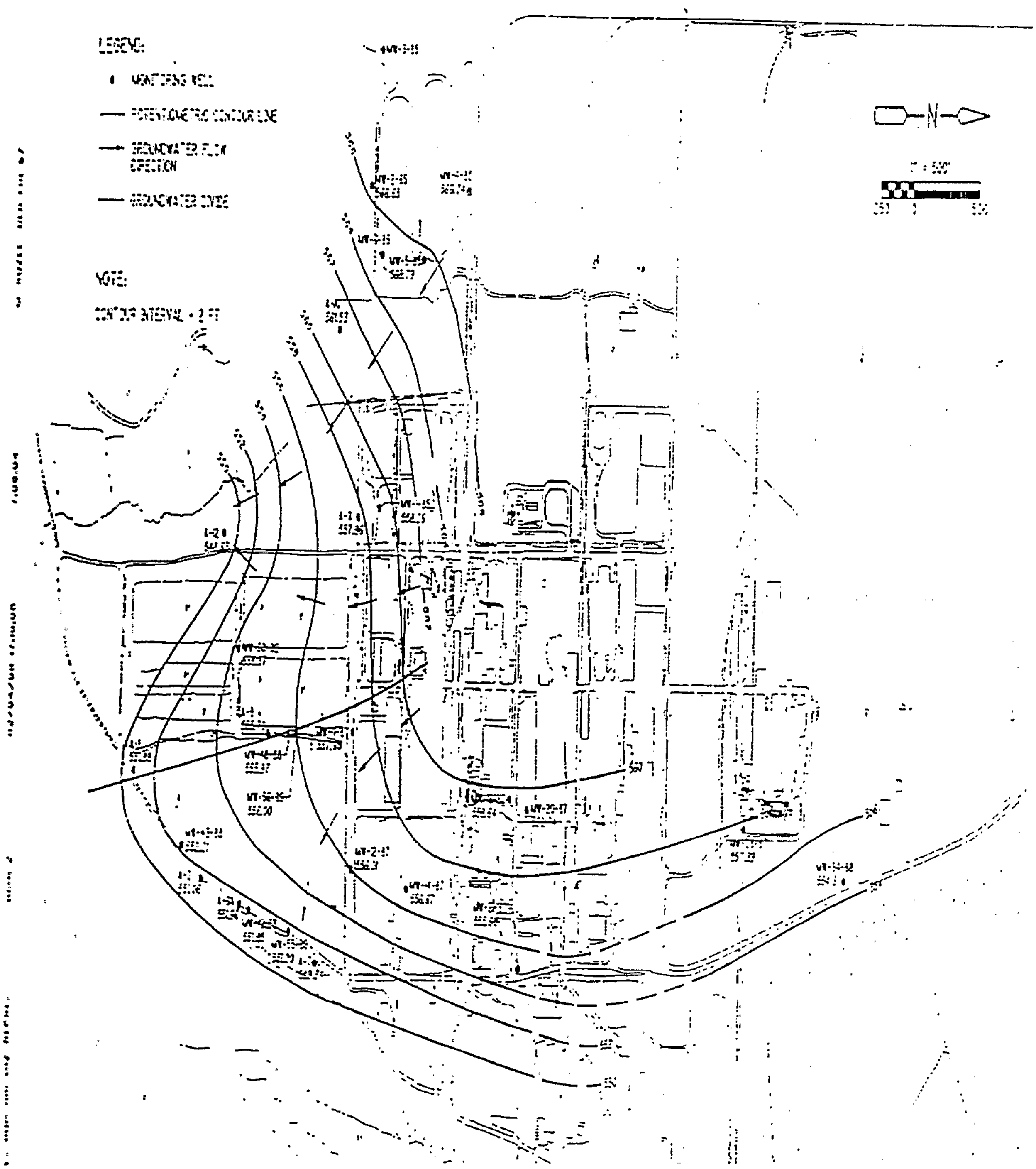


Figure No. 7
HSU1 POTENTIOMETRIC SURFACE MAP, SEPTEMBER 1997
AMOCO JOLIET LANDFILL
JOLIET, ILLINOIS

CDM Camp Dresser & McKee

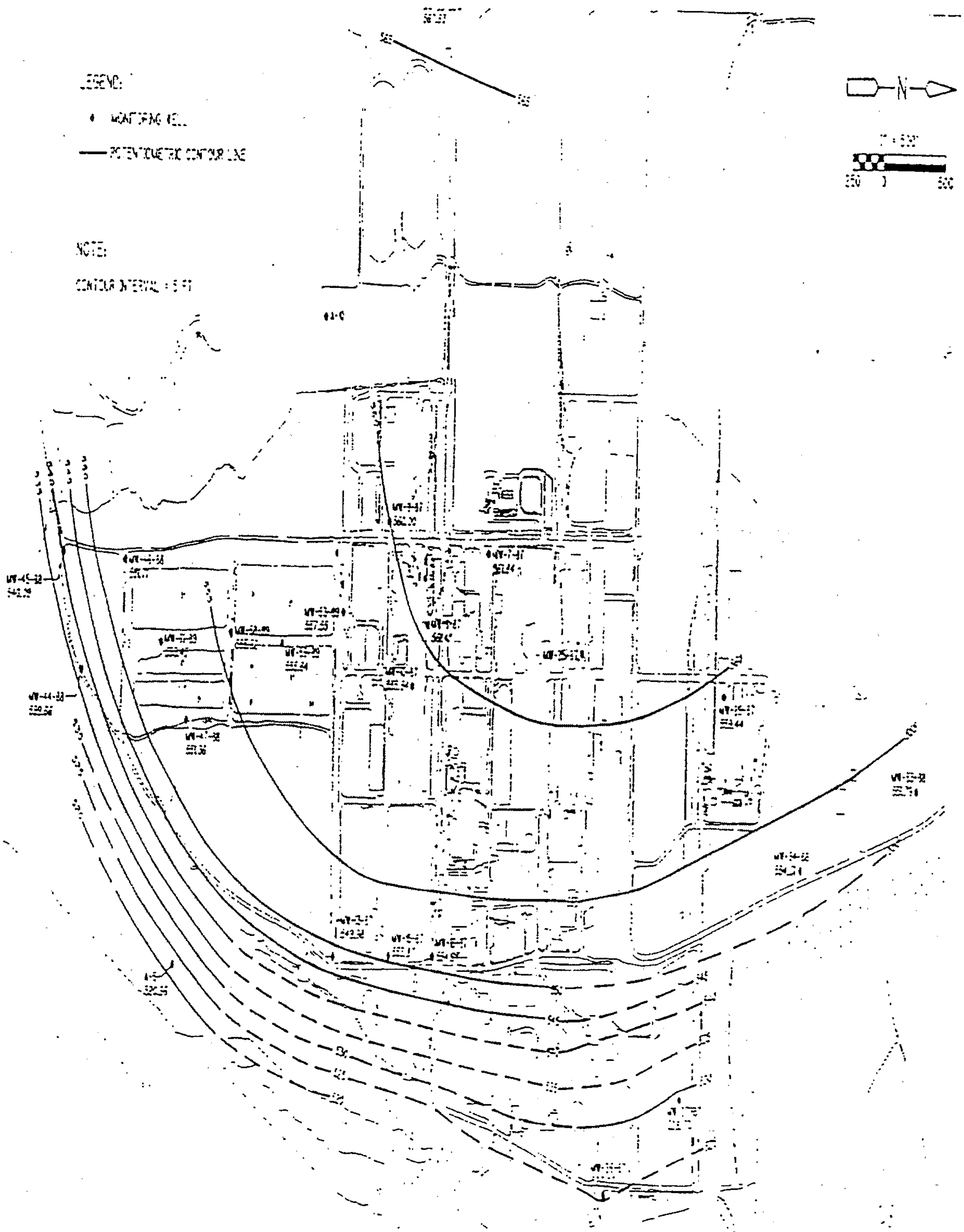


Figure No. 3
TRANSITION WELLS POTENTIOMETRIC SURFACE MAP, SEPTEMBER 1997
AMOCO JOLIET LANDFILL
JOLIET, ILLINOIS

CDM Camp Dresser & McKee

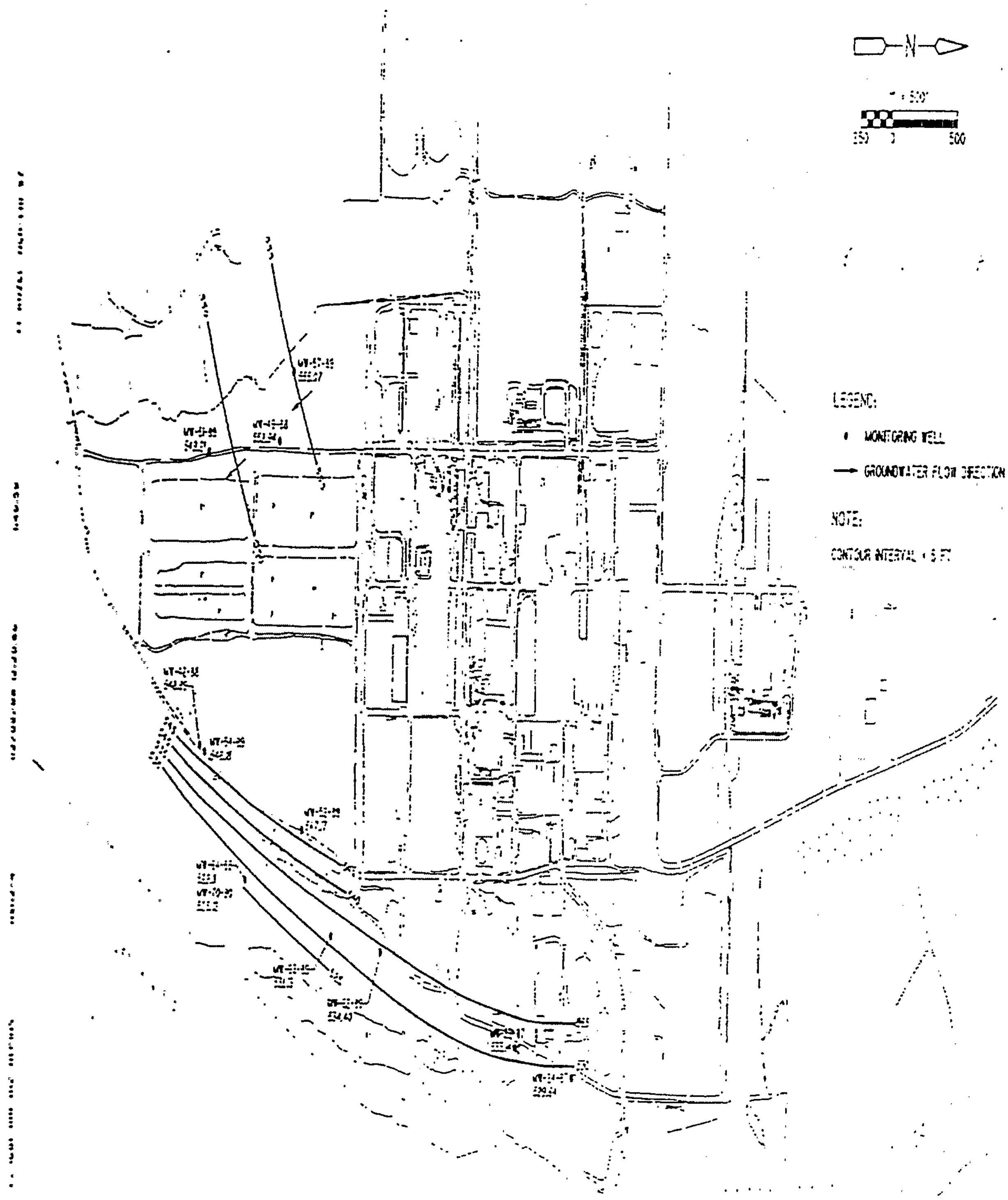


Figure No. 9
HSU2 POTENTIOMETRIC SURFACE MAP, SEPTEMBER 1997
AMOCO JOLIET LANDFILL
JOLIET, ILLINOIS

CDM Camp Dresser & McKee

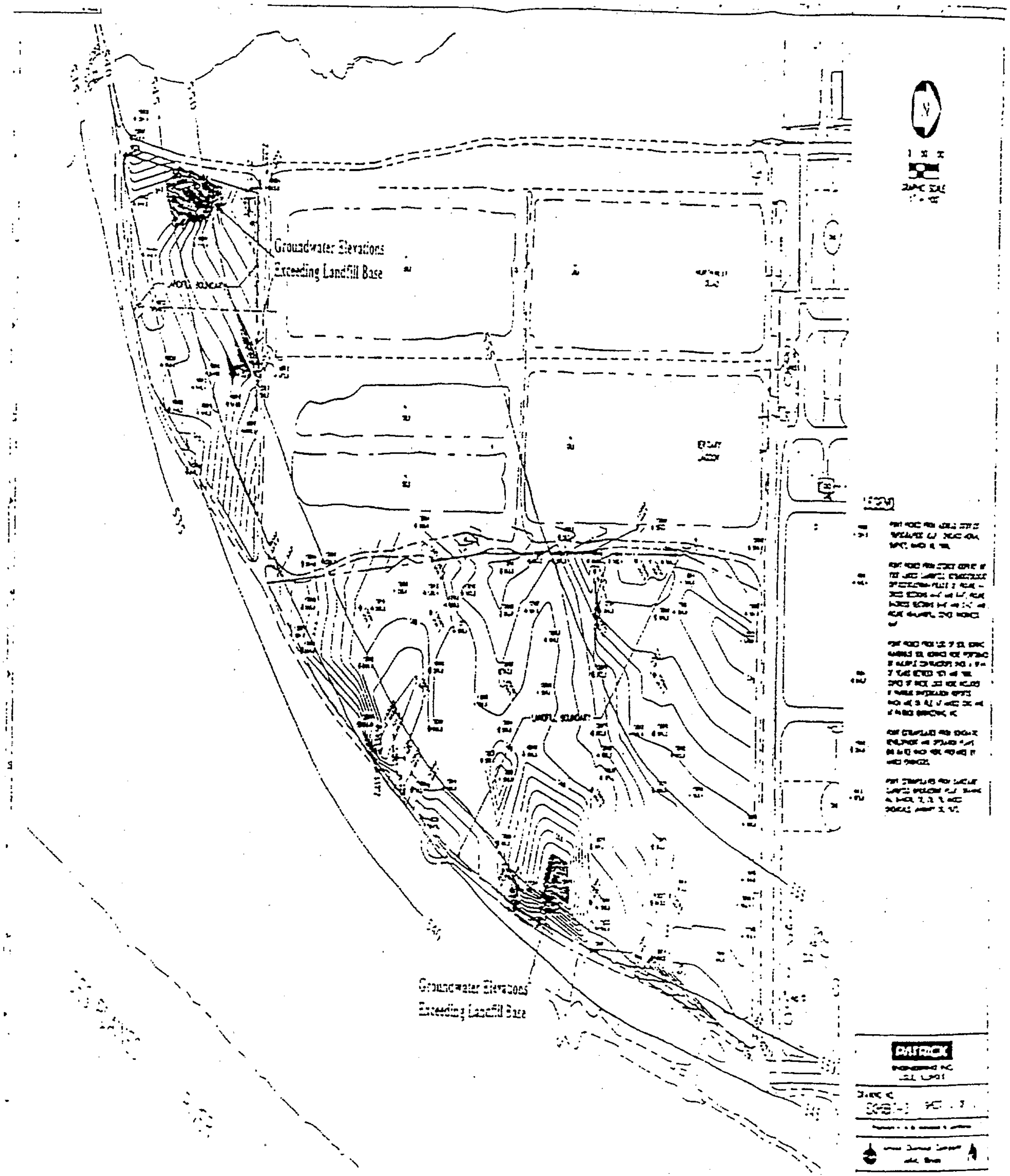
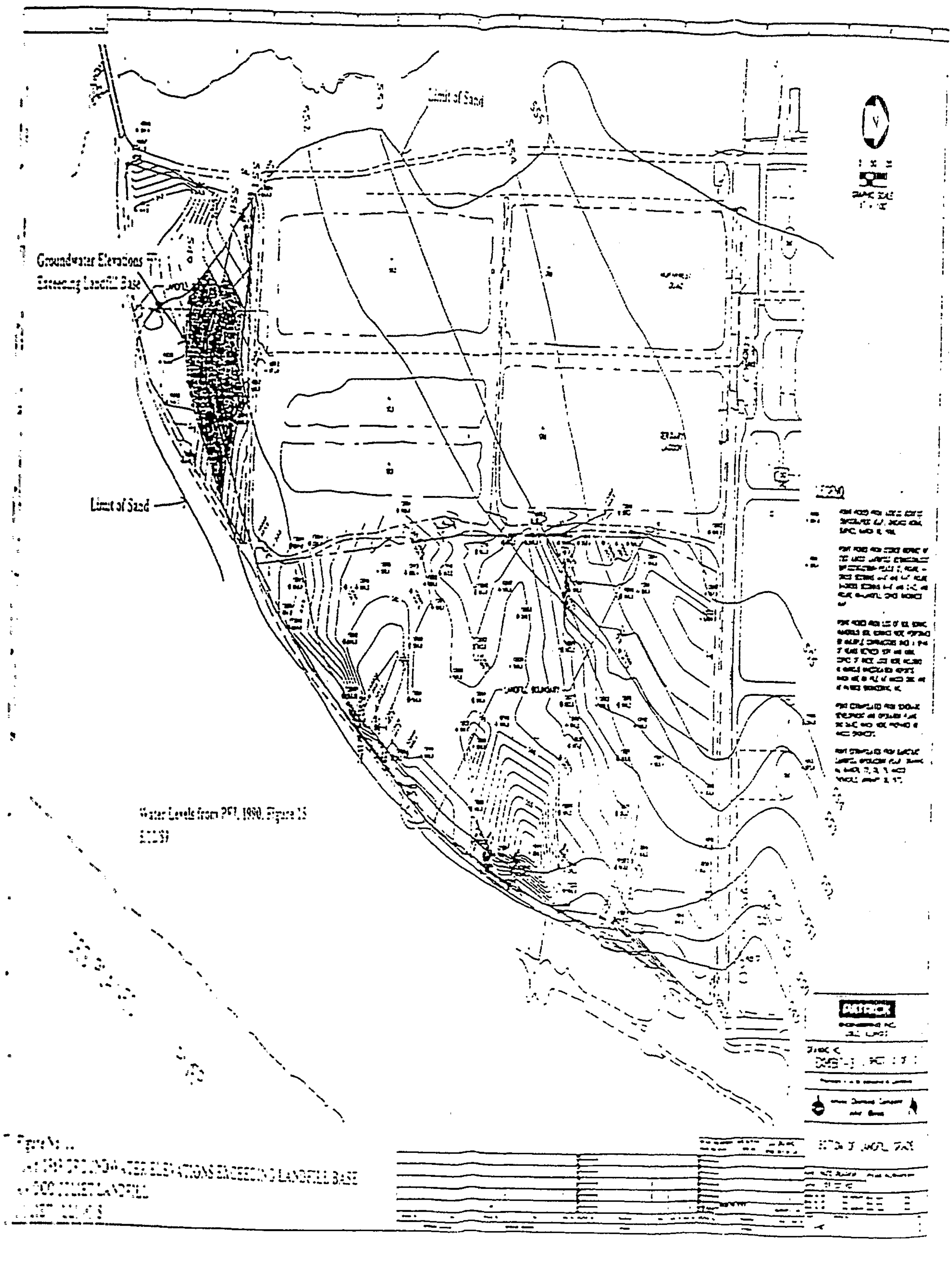


Figure No. [illegible]

[illegible] GROUNDWATER ELEVATIONS EXCEEDING LANDFILL BASE

[illegible] LANDFILL

[illegible]


Limit of Sand
Groundwater Elevations Exceeding Landfill Base
Limit of Sand
Water Levels from PRI 1990, Figure 15

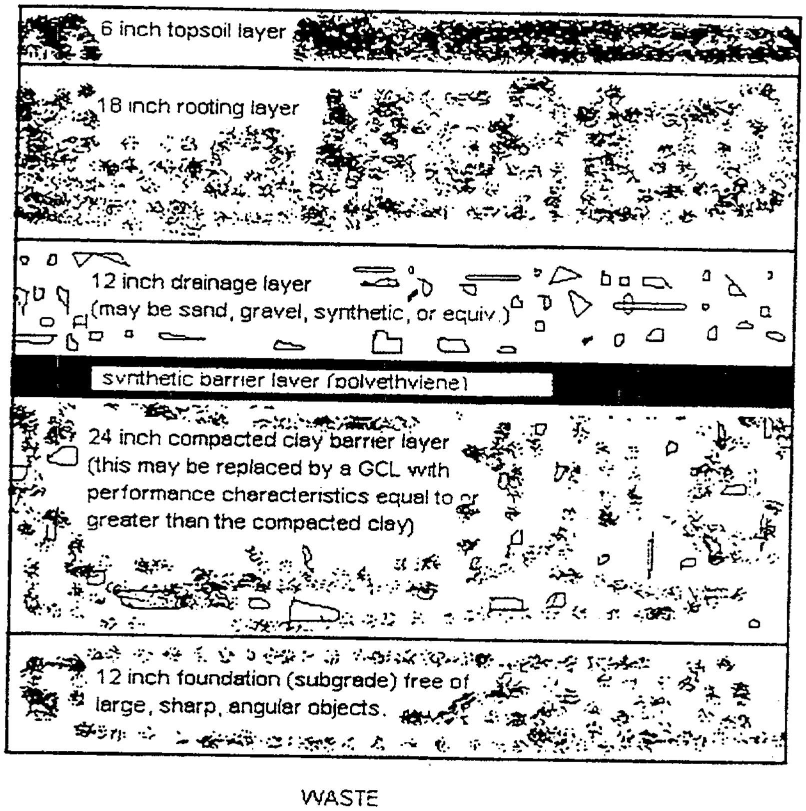


FIGURE - 12
Cap Component Schematic
Amoco Chemicals (Joliet Landfills)

APPENDIX B

TABLES

LIST OF TABLES

TABLE 1
SUMMARY OF SEEP AND SURFACE SOIL ANALYSES
AMOCO JOLIET LANDFILL RI/FS

Field ID:		JL-SP01-1	JL-SP02-1	JL-SP03-1	JL-SP52-1	RSS-01
Sample ID:		11068-002	11068-003	11068-005	11068-004	11068-001
Date Collected :		9-May-96	9-May-96	9-May-96	9-May-96	9-May-96
Parameter	Units					
VOLATILES (CLP '92)						
Chloromethane	ug/L	ND	ND	ND	ND	ND
Bromomethane	ug/L	ND	ND	ND	ND	ND
Vinyl Chloride	ug/L	ND	ND	ND	ND	ND
Chloroethane	ug/L	2	ND	ND	ND	ND
Methylene Chloride	ug/L	ND	ND	ND	ND	ND
Acetone	ug/L	5 R	ND	ND	ND	5 R
Carbon Disulfide	ug/L	ND	ND	ND	ND	ND
1,1-Dichloroethene	ug/L	ND	ND	ND	ND	ND
1,1-Dichloroethane	ug/L	ND	ND	ND	ND	ND
1,2-Dichloroethene (Total)	ug/L	ND	ND	ND	ND	ND
Chloroform	ug/L	ND	ND	ND	ND	ND
1,2-Dichloroethane	ug/L	ND	ND	ND	ND	ND
2-Butanone	ug/L	7 J	5 R	5 R	5 R	5 R
1,1,1-Trichloroethane	ug/L	ND	ND	ND	ND	ND
Carbon Tetrachloride	ug/L	ND	ND	ND	ND	ND
Bromodichloromethane	ug/L	ND	ND	ND	ND	ND
1,2-Dichloropropane	ug/L	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	ug/L	ND	ND	ND	ND	ND
Trichloroethene	ug/L	ND	ND	ND	ND	ND
Dibromochloromethane	ug/L	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ug/L	ND	ND	ND	ND	ND
Benzene	ug/L	5	ND	0.7 J	ND	ND
trans-1,3-Dichloropropene	ug/L	ND	ND	ND	ND	ND
Bromoform	ug/L	ND	ND	ND	ND	ND
4-Methyl-2-Pentanone	ug/L	ND	ND	ND	ND	ND
2-Hexanone	ug/L	ND	ND	ND	ND	ND
Tetrachloroethene	ug/L	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ug/L	ND	ND	ND	ND	ND
Toluene	ug/L	ND	ND	ND	ND	0.5 J
Chlorobenzene	ug/L	ND	ND	ND	ND	ND
EthylBenzene	ug/L	ND	ND	ND	ND	ND
Styrene	ug/L	ND	ND	ND	ND	ND
Xylene (total)	ug/L	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ug/L	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ug/L	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ug/L	ND	ND	ND	ND	ND

TABLE 1
SUMMARY OF SEEP AND SURFACE SOIL ANALYSES
AMOCO JOLIET LANDFILL RI/FS

Field ID:		JL-SS01-1	JL-SS02-1	JL-SS03-1	JL-SS52-1
Sample ID:		11068-006	11068-007	11068-008	11068-009
Date Collected :		9-May-96	9-May-96	9-May-96	9-May-96
Parameter	Units				
VOLATILES (CLP '90)					
Chloromethane	ug/Kg	ND	ND	ND	ND
Bromomethane	ug/Kg	ND	ND	ND	ND
Vinyl Chloride	ug/Kg	ND	ND	ND	ND
Chloroethane	ug/Kg	ND	ND	ND	ND
Methylene Chloride	ug/Kg	ND	ND	ND	ND
Acetone	ug/Kg	190 J	84 J	64 J	100 J
Carbon Disulfide	ug/Kg	ND	ND	ND	ND
1,1-Dichloroethene	ug/Kg	ND	ND	ND	ND
1,1-Dichloroethane	ug/Kg	ND	ND	ND	ND
1,2-Dichloroethene (Total)	ug/Kg	ND	ND	ND	ND
Chloroform	ug/Kg	ND	ND	ND	ND
1,2-Dichloroethane	ug/Kg	ND	ND	ND	ND
2-Butanone	ug/Kg	62 J	31 J	22 J	33 J
1,1,1-Trichloroethane	ug/Kg	ND	ND	ND	ND
Carbon Tetrachloride	ug/Kg	ND	ND	ND	ND
Bromodichloromethane	ug/Kg	ND	ND	ND	ND
1,2-Dichloropropane	ug/Kg	ND	ND	ND	ND
cis-1,3-Dichloropropene	ug/Kg	ND	ND	ND	ND
Trichloroethene	ug/Kg	ND	ND	ND	ND
Dibromochloromethane	ug/Kg	ND	ND	ND	ND
1,1,2-Trichloroethane	ug/Kg	ND	ND	ND	ND
Benzene	ug/Kg	12 J	ND	ND	ND
trans-1,3-Dichloropropene	ug/Kg	ND	ND	ND	ND
Bromoform	ug/Kg	ND	ND	ND	ND
4-Methyl-2-Pentanone	ug/Kg	ND	ND	ND	ND
2-Hexanone	ug/Kg	ND	ND	ND	ND
Tetrachloroethene	ug/Kg	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ug/Kg	ND	ND	ND	ND
Toluene	ug/Kg	4 J	ND	ND	ND
Chlorobenzene	ug/Kg	ND	ND	ND	ND
EthylBenzene	ug/Kg	ND	ND	ND	ND
Styrene	ug/Kg	ND	ND	ND	ND
Xylene (total)	ug/Kg	ND	ND	ND	ND

TABLE 1

SUMMARY OF SEEP AND SURFACE SOIL ANALYSES

AMOCO JOLIET LANDFILL RI/FS

Field ID:		JL-SP01-1	JL-SP02-1	JL-SP03-1	JL-SP51-1	RSS-01
Sample ID:		11068-002	11068-003	11068-005	11068-004	11068-001
Date Collected :		9-May-96	9-May-96	9-May-96	9-May-96	9-May-96
Parameter	Units					
SEMI-VOLATILES						
N-Nitrosodimethylamine	ug/L	ND	ND	ND	ND	ND
Phenol	ug/L	ND	ND	ND	ND	ND
bis(2-Chloroethyl)Ether	ug/L	ND	ND	ND	ND	ND
2-Chlorophenol	ug/L	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ug/L	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ug/L	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ug/L	ND	ND	ND	ND	ND
2,2'-oxybis(1-Chloropropane)	ug/L	ND	ND	ND	ND	ND
N-nitroso-di-n-propylamine	ug/L	ND	ND	ND	ND	ND
Hexachloroethane	ug/L	ND	ND	ND	ND	ND
Nitrobenzene	ug/L	ND	ND	ND	ND	ND
Isophorone	ug/L	ND	ND	ND	ND	ND
2-Nitrophenol	ug/L	ND	ND	ND	ND	ND
2,4-Dimethylphenol	ug/L	ND	ND	ND	ND	ND
bis(2-Chloroethoxy)Methane	ug/L	ND	ND	ND	ND	ND
2,4-Dichlorophenol	ug/L	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ug/L	ND	ND	ND	ND	ND
Naphthalene	ug/L	ND	ND	ND	ND	ND
Hexachlorobutadiene	ug/L	ND	ND	ND	ND	ND
4-Chloro-3-Methylphenol	ug/L	ND	ND	ND	ND	ND
Hexachlorocyclopentadiene	ug/L	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	ug/L	ND	ND	ND	ND	ND
2-Chloronaphthalene	ug/L	ND	ND	ND	ND	ND
DimethylPhthalate	ug/L	ND	ND	ND	ND	ND
Azobenzene	ug/L	ND	ND	ND	ND	ND
Acenaphthylene	ug/L	ND	ND	ND	ND	ND
2,6-Dinitrotoluene	ug/L	ND	ND	ND	ND	ND
Acenaphthene	ug/L	ND	ND	ND	ND	ND
2,4-Dinitrophenol	ug/L	ND	ND	ND	ND	ND
4-Nitrophenol	ug/L	ND	ND	ND	ND	ND
2,4-Dinitrotoluene	ug/L	ND	ND	ND	ND	ND
Diethylphthalate	ug/L	ND	ND	ND	ND	ND
4-Chlorophenyl-Phenyl-Ether	ug/L	ND	ND	ND	ND	ND
Fluorene	ug/L	ND	ND	ND	ND	ND
4,6-Dinitro-2-Methylphenol	ug/L	ND	ND	ND	ND	ND

TABLE 1
SUMMARY OF SEEP AND SURFACE SOIL ANALYSES
AMOCO JOLIET LANDFILL RI/FS

Field ID:		JL-SP01-1	JL-SP02-1	JL-SP03-1	JL-SP52-1	RSS-01
Sample ID:		11068-002	11068-003	11068-005	11068-004	11068-001
Date Collected :		9-May-96	9-May-96	9-May-96	9-May-96	9-May-96
Parameter	Units					
SEMI-VOLATILES (CONT)						
n-Nitrosodiphenylamine	ug/L	ND	ND	ND	ND	ND
4-Bromophenyl-Phenyl Ether	ug/L	ND	ND	ND	ND	ND
Hexachlorobenzene	ug/L	ND	ND	ND	ND	ND
Pentachlorophenol	ug/L	ND	ND	ND	ND	ND
Phenanthrene	ug/L	ND	ND	ND	ND	ND
Anthracene	ug/L	ND	ND	ND	ND	ND
Di-n-Butylphthalate	ug/L	ND	ND	ND	ND	ND
Fluoranthene	ug/L	ND	ND	ND	ND	ND
Pyrene	ug/L	ND	ND	ND	ND	ND
ButylBenzylPhthalate	ug/L	ND	ND	ND	ND	ND
3,3'-Dichlorobenzidine	ug/L	ND	ND	ND	ND	ND
Benzo(a)Anthracene	ug/L	ND	ND	ND	ND	ND
Chrysene	ug/L	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)Phthalate	ug/L	ND	ND	ND	ND	ND
di-N-OctylPhthalate	ug/L	ND	ND	ND	ND	ND
Benzo(b)Fluoranthene	ug/L	ND	ND	ND	ND	ND
Benzo(k)Fluoranthene	ug/L	ND	ND	ND	ND	ND
Benzo(a)Pyrene	ug/L	ND	ND	ND	ND	ND
Indeno(1,2,3-CD)Pyrene	ug/L	ND	ND	ND	ND	ND
Dibenz(a,h)Anthracene	ug/L	ND	ND	ND	ND	ND
Benzo(g,h,i)Perylene	ug/L	ND	ND	ND	ND	ND

TABLE 1
SUMMARY OF SEEP AND SURFACE SOIL ANALYSES
AMOCO JOLIET LANDFILL RI/FS

Field ID:		JL-SS01-1	JL-SS02-1	JL-SS03-1	JL-SS52-1
Sample ID:		11068-006	11068-007	11068-008	11068-009
Date Collected :		9-May-96	9-May-96	9-May-96	9-May-96
Parameter	Units				
SEMI-VOLATILES					
N-Nitrosodimethylamine	ug/Kg	ND	ND	ND	ND
Phenol	ug/Kg	560 J	ND	ND	ND
bis(2-Chloroethyl)Ether	ug/Kg	ND	ND	ND	ND
2-Chlorophenol	ug/Kg	ND	ND	ND	ND
1,3-Dichlorobenzene	ug/Kg	ND	ND	ND	ND
1,4-Dichlorobenzene	ug/Kg	ND	ND	ND	ND
1,2-Dichlorobenzene	ug/Kg	ND	ND	ND	ND
2,2'-oxybis(1-Chloropropane)	ug/Kg	ND	ND	ND	ND
N-nitroso-di-n-propylamine	ug/Kg	ND	ND	ND	ND
Hexachloroethane	ug/Kg	ND	ND	ND	ND
Nitrobenzene	ug/Kg	ND	ND	ND	ND
Isophorone	ug/Kg	ND	ND	ND	ND
2-Nitrophenol	ug/Kg	ND	ND	ND	ND
2,4-Dimethylphenol	ug/Kg	ND	ND	ND	ND
bis(2-Chloroethoxy)Methane	ug/Kg	ND	ND	ND	ND
2,4-Dichlorophenol	ug/Kg	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ug/Kg	ND	ND	ND	ND
Naphthalene	ug/Kg	ND	ND	ND	ND
Hexachlorobutadiene	ug/Kg	ND	ND	ND	ND
4-Chloro-3-Methylphenol	ug/Kg	ND	ND	ND	ND
Hexachlorocyclopentadiene	ug/Kg	ND	ND	ND	ND
2,4,6-Trichlorophenol	ug/Kg	ND	ND	ND	ND
2-Chloronaphthalene	ug/Kg	ND	ND	ND	ND
DimethylPhthalate	ug/Kg	ND	ND	ND	ND
Azobenzene	ug/Kg	ND	ND	ND	ND
Acenaphthylene	ug/Kg	ND	ND	ND	ND
2,6-Dinitrotoluene	ug/Kg	ND	ND	ND	ND
Acenaphthene	ug/Kg	ND	ND	ND	ND
2,4-Dinitrophenol	ug/Kg	ND	ND	ND	ND
4-Nitrophenol	ug/Kg	ND	ND	ND	ND
2,4-Dinitrotoluene	ug/Kg	ND	ND	ND	ND
Diethylphthalate	ug/Kg	ND	ND	ND	ND
4-Chlorophenyl-PhenylEther	ug/Kg	ND	ND	ND	ND
Fluorene	ug/Kg	ND	ND	ND	ND
4,6-Dinitro-2-Methylphenol	ug/Kg	ND	ND	ND	ND

TABLE 1

SUMMARY OF SEEP AND SURFACE SOIL ANALYSES

AMOCO JOLIET LANDFILL RI/FS

Field ID:		JL-SS01-1	JL-SS02-1	JL-SS03-1	JL-SS52-1
Sample ID:		11068-006	11068-007	11068-008	11068-009
Date Collected :		9-May-96	9-May-96	9-May-96	9-May-96
Parameter	Units				
SEMI-VOLATILES (CONT)					
n-Nitrosodiphenylamine	ug/Kg	ND	ND	ND	ND
4-Bromophenyl-Phenyl Ether	ug/Kg	ND	ND	ND	ND
Hexachlorobenzene	ug/Kg	ND	ND	ND	ND
Pentachlorophenol	ug/Kg	ND	ND	ND	ND
Phenanthrene	ug/Kg	ND	ND	ND	ND
Anthracene	ug/Kg	ND	ND	ND	ND
Di-n-Butylphthalate	ug/Kg	ND	ND	ND	ND
Fluoranthene	ug/Kg	ND	ND	190 J	ND
Pyrene	ug/Kg	ND	ND	150 J	ND
ButylBenzylPhthalate	ug/Kg	ND	ND	ND	ND
3,3'-Dichlorobenzidine	ug/Kg	ND	ND	ND	ND
Benzo(a)Anthracene	ug/Kg	ND	ND	ND	ND
Chrysene	ug/Kg	ND	ND	ND	ND
bis(2-Ethylhexyl)Phthalate	ug/Kg	ND	100 J	ND	170 J
di-N-OctylPhthalate	ug/Kg	ND	ND	ND	ND
Benzo(b)Fluoranthene	ug/Kg	ND	ND	ND	ND
Benzo(k)Fluoranthene	ug/Kg	ND	ND	ND	ND
Benzo(a)Pyrene	ug/Kg	ND	ND	ND	ND
Indeno(1,2,3-CD)Pyrene	ug/Kg	ND	ND	ND	ND
Dibenz(a,h)Anthracene	ug/Kg	ND	ND	ND	ND
Benzo(g,h,i)Perylene	ug/Kg	ND	ND	ND	ND

TABLE 1

SUMMARY OF SEEP AND SURFACE SOIL ANALYSES

AMOCO JOLIET LANDFILL RI/FS

Field ID:		JL-SP01-1	JL-SP02-1	JL-SP03-1	JL-SP52-1	RSS-01
Date Collected :		9-May-96	9-May-96	9-May-96	9-May-96	9-May-96
	Units					
ORGANIC ACIDS						
Maleic Acid	ug/ml	ND	ND	ND	ND	ND
Trimellitic Acid	ug/ml	ND	ND	ND	ND	ND
Phthalic Acid	ug/ml	ND	ND	ND	ND	ND
Terephthalic Acid	ug/ml	0.68	0.1	0.25	0.11	ND
Isophthalic Acid	ug/ml	42.48	0.8	1.8	1	ND
Benzoic Acid	ug/ml	55.84	0.71	20.04	0.8	ND

Field ID:		JL-SS01-1	JL-SS02-1	JL-SS03-1
Date Collected :		9-May-96	9-May-96	9-May-96
	Units			
ORGANIC ACIDS				
Maleic Acid	ug/ml	4.14 J	ND	1.07 J
Trimellitic Acid	ug/ml	ND	0.1	ND
Phthalic Acid	ug/ml	ND	1.51	ND
Terephthalic Acid	ug/ml	0.57 J	0.48 J	0.1 J
Isophthalic Acid	ug/ml	5.93	4.9	ND
Benzoic Acid	ug/ml	5.92	8.1	1.4

TABLE 1

SUMMARY OF SEEP AND SURFACE SOIL ANALYSES

AMOCO JOLIET LANDFILL RI/FS

Field ID:		JL-SP01-1	JL-SP02-1	JL-SP02	JL-SP03-1	JL-SP03	JL-SP52-1	RSS-01	RSS-02
Sample ID:		11068-002	11068-003	11255-002	11068-005	11255-003	11068-004	11068-001	11255-001
Date Collected :		9-May-96	9-May-96	3-Jun-96	9-May-96	3-Jun-96	9-May-96	9-May-96	3-Jun-96
Parameter	Units								
PESTICIDES/PCBS									
alpha-BHC	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
beta-BHC	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
delta-BHC	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
gamma-BHC (Lindane)	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Aldrin	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor Epoxide	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan I	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Dieldrin	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDE	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Endrin	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan II	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDD	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Endosulfan Sulfate	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
4,4'-DDT	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Endrin Aldehyde	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Methoxychlor	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Toxaphene	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
T. Chlordane	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1016	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1221	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1232	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1242	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1248	ug/L	ND	2.0	ND	[illegible]	ND	ND	ND	ND
Aroclor-1254	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1260	ug/L	ND	ND	ND	ND	ND	ND	ND	ND

Note: The results for sample SP52 (the duplicate of SP02) and SP03 appear to be reversed.

The matrix spike/matrix spike duplicate sample taken at location SP02 confirm Aroclor 1248 is present in the sample.

Results obtained from the samples collected June 3, 1996 confirm Aroclor 1248 is not present at the seeps.

TABLE 1

SUMMARY OF SEEP AND SURFACE SOIL ANALYSES

AMOCO JOLIET LANDFILL RI/FS

Field ID:		JL-SS01-1	JL-SS02-1	JL-SS03-1	JL-SS52-1
Sample ID:		11068-006	11068-007	11068-008	11068-009
Date Collected :		9-May-96	9-May-96	9-May-96	9-May-96
Parameter	Units				
PESTICIDES/PCBS					
alpha-BHC	ug/Kg	ND	ND	ND	ND
beta-BHC	ug/Kg	ND	ND	ND	ND
delta-BHC	ug/Kg	ND	ND	ND	ND
gamma-BHC (Lindane)	ug/Kg	ND	ND	ND	ND
Heptachlor	ug/Kg	ND	ND	ND	ND
Aldrin	ug/Kg	ND	ND	ND	ND
Heptachlor Epoxide	ug/Kg	ND	ND	ND	ND
Endosulfan I	ug/Kg	ND	ND	ND	ND
Dieldrin	ug/Kg	ND	ND	ND	ND
4,4'-DDE	ug/Kg	ND	ND	ND	ND
Endrin	ug/Kg	ND	ND	ND	ND
Endosulfan II	ug/Kg	ND	ND	ND	ND
4,4'-DDD	ug/Kg	ND	ND	ND	ND
Endosulfan Sulfate	ug/Kg	ND	ND	ND	ND
4,4'-DDT	ug/Kg	ND	ND	ND	ND
Methoxychlor	ug/Kg	ND	ND	ND	ND
Endrin Ketone	ug/Kg	ND	ND	ND	ND
Endrin Aldehyde	ug/Kg	ND	ND	ND	ND
Alpha-Chlordane	ug/Kg	ND	ND	ND	ND
Gamma-Chlordane	ug/Kg	ND	ND	ND	ND
Toxaphene	ug/Kg	ND	ND	ND	ND
Aroclor-1016	ug/Kg	ND	ND	ND	ND
Aroclor-1221	ug/Kg	ND	ND	ND	ND
Aroclor-1232	ug/Kg	ND	ND	ND	ND
Aroclor-1242	ug/Kg	ND	ND	ND	ND
Aroclor-1248	ug/Kg	520 J	2100	180 J	1600
Aroclor-1254	ug/Kg	ND	ND	ND	ND
Aroclor-1260	ug/Kg	140 J	400 J	83 J	250 J

TABLE 1

SUMMARY OF SEEP AND SURFACE SOIL ANALYSES

AMOCO JOLIET LANDFILL RI/FS

Field ID:		JL-SP01-1	JL-SP01-1	JL-SP02-1	JL-SP02-1	JL-SP03-1	JL-SP03-1	JL-SP52-1	JL-SP52-1
Sample ID:		11068-002	11068-002	11068-003	11068-003	11068-005	11068-005	11068-004	11068-004
Date Collected :		9-May-96	9-May-96	9-May-96	9-May-96	9-May-96	9-May-96	9-May-96	9-May-96
	Units	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
INORGANICS									
Antimony	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	ug/L	18.9	5.1 B	113	6.0 B	10.4	3.9 B	102	9.2 B
Barium	ug/L	491	183 B	920	141 B	166 B	102 B	904	142 B
Beryllium	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	ug/L	ND	ND	6.7	ND	ND	ND	7.2	ND
Chromium	ug/L	7.1 B	6.5 B	123	ND	6.6 B	ND	107	ND
Cobalt	ug/L	58.3	14.9 B	10600	3070	11.0 B	14.2 B	9490	3120
Copper	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Iron	ug/L	63400	10400	155000	ND	13500	973	150000	ND
Lead	ug/L	ND	ND	8.3	ND	11.4	ND	ND	ND
Manganese	ug/L	831	381	1300	302	239	170	1100	304
Mercury	ug/L	0.52	0.33	0.13 B	ND	0.35	0.15 B	0.14 B	ND
Nickel	ug/L	ND	ND	200	56.8	9.8 B	ND	176	49.2
Selenium	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Silver	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Thallium	ug/L	ND	ND	24.0	4.5 B	ND	ND	22.4	6.4 B
Zinc	ug/L	47.6	23.6	402	11.6 B	32.4	9.0 B	330	13.1 B
Cyanide	ug/L	ND		ND		ND		15.5	

TABLE 1

SUMMARY OF SEEP AND SURFACE SOIL ANALYSES

AMOCO JOLIET LANDFILL RI/FS

Field ID:		RSS-01	RSS-01
Sample ID:		11068-001	11068-001
Date Collected :		9-May-96	9-May-96
	Units	Total	Dissolved
INORGANICS			
Antimony	ug/L	35.0 B	ND
Arsenic	ug/L	ND	ND
Barium	ug/L	2.3 B	2.0 B
Beryllium	ug/L	0.51 B	ND
Cadmium	ug/L	ND	ND
Chromium	ug/L	ND	ND
Cobalt	ug/L	ND	ND
Copper	ug/L	6.1 B	ND
Iron	ug/L	34.0 B	39.6 B
Lead	ug/L	0.79 B	ND
Manganese	ug/L	1.7 B	ND
Mercury	ug/L	ND	ND
Nickel	ug/L	ND	ND
Selenium	ug/L	ND	ND
Silver	ug/L	ND	ND
Thallium	ug/L	ND	ND
Zinc	ug/L	9.0 B	8.2 B
Cyanide	ug/L	1.2 B	

TABLE 1

SUMMARY OF SEEP AND SURFACE SOIL ANALYSES

AMOCO JOLIET LANDFILL RI/FS

Field ID:		JL-SS01-1	JL-SS02-1	JL-SS03-1	JL-SS52-1
Sample ID:		11068-006	11068-007	11068-008	11068-009
Date Collected :		9-May-96	9-May-96	9-May-96	9-May-96
	Units	Total	Total	Total	Total
INORGANICS					
Antimony	mg/Kg	ND	ND	ND	ND
Arsenic	mg/Kg	9.3	66.5	10.5	61.6
Barium	mg/Kg	275	1180	161	1010
Beryllium	mg/Kg	0.77 B	0.58 B	0.59 B	0.43 B
Cadmium	mg/Kg	3.5	11.0 B	ND	9.5
Chromium	mg/Kg	15.8	421	8.1	278
Cobalt	mg/Kg	268	4000	10.9 B	3920
Copper	mg/Kg	ND	ND	25.3	ND
Iron	mg/Kg	72200	215000	18900	194000
Lead	mg/Kg	23.3	18.6	30.9	14.6
Manganese	mg/Kg	2670	1710	384	1690
Mercury	mg/Kg	ND	0.18 B	0.11 B	ND
Nickel	mg/Kg	ND	70.9	16.4 B	65.5
Selenium	mg/Kg	1.6 B	3.1	1.7 B	2.4 B
Silver	mg/Kg	ND	ND	ND	ND
Thallium	mg/Kg	4.5 B	18.3	2.5 B	16.3 B
Zinc	mg/Kg	107	525	53.9	389
Cyanide	mg/Kg	0.75 J	1.9 B	0.40 J	0.77 J

TABLE 2a
SUMMARY OF SOIL SAMPLES ORGANIC ANALYSES
AMOCO JOLIET LANDFILL RI/FS

Field ID:		SB01-0-1	SB01-8-10	SB02-0-1	SB02-8-12	SB03-0-1	SB03-7-10	SB04-0-1
Sample ID:		9670-001	9704-001	9670-002	9704-002	9670-003	9704-003	9670-004
Date Collected :		25-Oct-95	1-Nov-96	25-Oct-95	31-Oct-95	25-Oct-95	31-Oct-95	25-Oct-95
Parameter	Units							
VOLATILES								
Chloromethane	ug/kg	ND	ND	ND	ND	ND	ND	ND
Bromomethane	ug/kg	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	ug/kg	ND	ND	ND	ND	ND	ND	ND
Chloroethane	ug/kg	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ug/kg	ND	ND	ND	ND	ND	ND	ND
Acetone	ug/kg	15 J	13 J	17 J	41 J	26 J	2200 J	ND
Carbon Disulfide	ug/kg	2 J	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ug/kg	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ug/kg	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethene (total)	ug/kg	ND	ND	ND	ND	ND	ND	ND
Chloroform	ug/kg	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ug/kg	ND	ND	ND	ND	ND	ND	ND
2-Butanone	ug/kg	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ug/kg	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	ug/kg	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ug/kg	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ug/kg	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	ug/kg	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ug/kg	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	ug/kg	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ug/kg	ND	ND	ND	ND	ND	ND	ND
Benzene	ug/kg	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ug/kg	ND	ND	ND	ND	ND	ND	ND
Bromoform	ug/kg	ND	ND	ND	ND	ND	ND	ND
4-Methyl-2-Pentanone	ug/kg	ND	ND	ND	ND	ND	ND	ND
2-Hexanone	ug/kg	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ug/kg	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ug/kg	ND	ND	ND	ND	ND	ND	ND
Toluene	ug/kg	ND	16 J	ND	ND	ND	ND	ND
Chlorobenzene	ug/kg	ND	ND	ND	ND	ND	ND	ND
EthylBenzene	ug/kg	ND	ND	ND	ND	ND	15 J	ND
Styrene	ug/kg	ND	ND	ND	20	ND	ND	ND
Xylene (total)	ug/kg	ND	ND	ND	ND	ND	ND	ND

TABLE 2a
SUMMARY OF SOIL SAMPLES ORGANIC ANALYSES
AMOCO JOLIET LANDFILL RI/FS

Field ID:		SB04-2-6	SB05-0-1	SB05-7-10	SB06-0-1	SB06-7-10
Sample ID:		9704-004	9670-005	9704-005	9670-006	9704-007
Date Collected :		31-Oct-95	25-Oct-95	31-Oct-95	25-Oct-95	31-Oct-95
Parameter	**Units**					
VOLATILES						
Chloromethane	ug/kg	ND	ND	ND	ND	ND
Bromomethane	ug/kg	ND	ND	ND	ND	ND
Vinyl Chloride	ug/kg	ND	ND	ND	ND	ND
Chloroethane	ug/kg	ND	ND	ND	ND	ND
Methylene Chloride	ug/kg	ND	ND	ND	ND	ND
Acetone	ug/kg	ND	11 J	5100 J	18 J	540 J
Carbon Disulfide	ug/kg	ND	3 J	ND	ND	ND
1,1-Dichloroethene	ug/kg	ND	ND	ND	ND	ND
1,1-Dichloroethane	ug/kg	ND	ND	ND	ND	ND
1,2-Dichloroethene (total)	ug/kg	ND	ND	ND	ND	ND
Chloroform	ug/kg	ND	ND	ND	ND	ND
1,2-Dichloroethane	ug/kg	ND	ND	ND	ND	ND
2-Butanone	ug/kg	ND	ND	28 J	ND	ND
1,1,1-Trichloroethane	ug/kg	ND	ND	ND	ND	ND
Carbon Tetrachloride	ug/kg	ND	ND	ND	ND	ND
Bromodichloromethane	ug/kg	ND	ND	ND	ND	ND
1,2-Dichloropropane	ug/kg	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	ug/kg	ND	ND	ND	ND	ND
Trichloroethene	ug/kg	ND	ND	ND	ND	ND
Dibromochloromethane	ug/kg	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ug/kg	ND	ND	ND	ND	ND
Benzene	ug/kg	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ug/kg	ND	ND	ND	ND	ND
Bromoform	ug/kg	ND	ND	ND	ND	ND
4-Methyl-2-Pentanone	ug/kg	ND	ND	ND	ND	ND
2-Hexanone	ug/kg	ND	ND	ND	ND	ND
Tetrachloroethene	ug/kg	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ug/kg	ND	ND	ND	ND	ND
Toluene	ug/kg	ND	54 J	400 J	6 J	510
Chlorobenzene	ug/kg	ND	ND	ND	ND	ND
EthylBenzene	ug/kg	4 J	ND	7 J	ND	ND
Styrene	ug/kg	ND	ND	ND	ND	ND
Xylene (total)	ug/kg	2 J	ND	2 J	ND	ND

TABLE 2a
SUMMARY OF SOIL SAMPLES ORGANIC ANALYSES
AMOCO JOLIET LANDFILL RI/FS

Field ID:		SB54-0-1	SB55-7-10
Sample ID:		9670-007	9704-006
Date Collected :		25-Oct-95	31-Oct-95
Parameter	**Units**		
VOLATILES			
Chloromethane	ug/kg	10 J	ND
Bromomethane	ug/kg	ND	ND
Vinyl Chloride	ug/kg	ND	ND
Chloroethane	ug/kg	ND	ND
Methylene Chloride	ug/kg	ND	ND
Acetone	ug/kg	30 J	4000 J
Carbon Disulfide	ug/kg	4 J	ND
1,1-Dichloroethene	ug/kg	ND	ND
1,1-Dichloroethane	ug/kg	ND	ND
1,2-Dichloroethene (total)	ug/kg	ND	ND
Chloroform	ug/kg	ND	ND
1,2-Dichloroethane	ug/kg	ND	ND
2-Butanone	ug/kg	ND	ND
1,1,1-Trichloroethane	ug/kg	ND	ND
Carbon Tetrachloride	ug/kg	ND	ND
Bromodichloromethane	ug/kg	ND	ND
1,2-Dichloropropane	ug/kg	ND	ND
cis-1,3-Dichloropropene	ug/kg	ND	ND
Trichloroethene	ug/kg	ND	ND
Dibromochloromethane	ug/kg	ND	ND
1,1,2-Trichloroethane	ug/kg	ND	ND
Benzene	ug/kg	ND	ND
trans-1,3-Dichloropropene	ug/kg	ND	ND
Bromoform	ug/kg	ND	ND
4-Methyl-2-Pentanone	ug/kg	ND	ND
2-Hexanone	ug/kg	ND	ND
Tetrachloroethene	ug/kg	ND	ND
1,1,2,2-Tetrachloroethane	ug/kg	ND	ND
Toluene	ug/kg	27 J	420 J
Chlorobenzene	ug/kg	ND	ND
EthylBenzene	ug/kg	ND	2 J
Styrene	ug/kg	ND	ND
Xylene (total)	ug/kg	ND	ND

TABLE 2a
SUMMARY OF SOIL SAMPLES ORGANIC ANALYSES
AMOCO JOLIET LANDFILL RI/FS

Field ID:		SB01-0-1	SB01-8-10	SB02-0-1	SB02-8-12	SB03-0-1	SB03-7-10	SB04-0-1	SB04-2-6
Sample ID:		9670-001	9704-001	9670-002	9704-002	9670-003	9704-003	9670-004	9704-004
Date Collected:		25-Oct-95	1-Nov-95	25-Oct-95	31-Oct-95	25-Oct-95	31-Oct-95	25-Oct-95	31-Oct-95
	Units								
SEMI-VOLATILES									
N-Nitrosodimethylamine	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
Phenol	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
bis(2-Chloroethyl)Ether	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorophenol	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
2,2'-oxybis(1-Chloropropane)	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
N-nitroso-di-n-propylamine	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
Hexachloroethane	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
Nitrobenzene	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
Isophorone	ug/kg	ND	ND	200 J	ND	ND	ND	ND	ND
2-Nitrophenol	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
bis(2-Chloroethoxy)Methane	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dichlorophenol	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
4-Chloro-3-Methylphenol	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorocyclopentadiene	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloronaphthalene	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
DimethylPhthalate	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
Azobenzene	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthylene	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
2,6-Dinitrotoluene	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dinitrophenol	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
4-Nitrophenol	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dinitrotoluene	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
4-Chlorophenyl-PhenylEther	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
Fluorene	ug/kg	130 J	ND	ND	ND	ND	ND	ND	ND
4,6-Dinitro-2-Methylphenol	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND

TABLE 2a

SUMMARY OF SOIL SAMPLES ORGANIC ANALYSES

AMOCO JOLIET LANDFILL RI/FS

Field ID:		SB01-0-1	SB01-8-10	SB02-0-1	SB02-8-12	SB03-0-1	SB03-7-10	SB04-0-1	SB04-2-6
Sample ID:		9670-001	9704-001	9670-002	9704-002	9670-003	9704-003	9670-004	9704-004
Date Collected :		25-Oct-95	1-Nov-96	25-Oct-95	31-Oct-95	25-Oct-95	31-Oct-95	25-Oct-95	31-Oct-95
	Units								
SEMI-VOLATILES (CONT)									
n-Nitrosodiphenylamine	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
4-Bromophenyl-Phenyl Ether	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobenzene	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
Pentachlorophenol	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	ug/kg	160 J	ND	ND	ND	ND	ND	ND	ND
Di-n-Butylphthalate	ug/kg	ND	120 J	ND	140 J	ND	170 J	ND	ND
Fluoranthene	ug/kg	100 J	ND	ND	ND	ND	ND	ND	ND
Pyrene	ug/kg	80 J	ND	ND	ND	ND	ND	ND	ND
ButylBenzylPhthalate	ug/kg	ND	ND	44 J	ND	ND	ND	ND	ND
3,3'-Dichlorobenzidine	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)Anthracene	ug/kg	61 J	ND	ND	ND	ND	ND	ND	ND
Chrysene	ug/kg	230 J	ND	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)Phthalate	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
di-N-OctylPhthalate	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)Fluoranthene	ug/kg	67 J	ND	ND	ND	ND	ND	ND	ND
Benzo(k)Fluoranthene	ug/kg	400 U	ND	ND	ND	ND	ND	ND	ND
Benzo(a)Pyrene	ug/kg	48 J	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-CD)Pyrene	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND
Dibenz(a,h)Anthracene	ug/kg	90 J	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)Perylene	ug/kg	ND	ND	ND	ND	ND	ND	ND	ND

TABLE 2a
SUMMARY OF SOIL SAMPLES ORGANIC ANALYSES
AMOCO JOLIET LANDFILL RI/FS

Field ID:		SB05-0-1	SB05-7-10	SB06-0-1	SB06-7-10	SB54-0-1	SB55-7-10
Sample ID:		9670-005	9704-005	9670-006	9704-007	9670-007	9704-006
Date Collected :		25-Oct-95	31-Oct-95	25-Oct-95	31-Oct-95	25-Oct-95	31-Oct-95
	Units						
SEMI-VOLATILES							
N-Nitrosodimethylamine	ug/kg	ND	ND	ND	ND	ND	ND
Phenol	ug/kg	ND	ND	ND	ND	ND	ND
bis(2-Chloroethyl)Ether	ug/kg	ND	ND	ND	ND	ND	ND
2-Chlorophenol	ug/kg	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ug/kg	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ug/kg	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ug/kg	ND	ND	ND	ND	ND	ND
2,2'-oxybis(1-Chloropropane)	ug/kg	ND	ND	ND	ND	ND	ND
N-nitroso-di-n-propylamine	ug/kg	ND	ND	ND	ND	ND	ND
Hexachloroethane	ug/kg	ND	ND	ND	ND	ND	ND
Nitrobenzene	ug/kg	ND	ND	ND	ND	ND	ND
Isophorone	ug/kg	ND	ND	ND	ND	ND	ND
2-Nitrophenol	ug/kg	ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	ug/kg	ND	ND	ND	ND	ND	ND
bis(2-Chloroethoxy)Methane	ug/kg	ND	ND	ND	ND	ND	ND
2,4-Dichlorophenol	ug/kg	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ug/kg	ND	ND	ND	ND	ND	ND
Naphthalene	ug/kg	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	ug/kg	ND	ND	ND	ND	ND	ND
4-Chloro-3-Methylphenol	ug/kg	ND	ND	ND	ND	ND	ND
Hexachlorocyclopentadiene	ug/kg	ND	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	ug/kg	ND	ND	ND	ND	ND	ND
2-Chloronaphthalene	ug/kg	ND	ND	ND	ND	ND	ND
DimethylPhthalate	ug/kg	ND	ND	ND	ND	ND	ND
Azobenzene	ug/kg	ND	ND	ND	ND	ND	ND
Acenaphthylene	ug/kg	ND	ND	ND	ND	ND	ND
2,6-Dinitrotoluene	ug/kg	ND	ND	ND	ND	ND	ND
Acenaphthene	ug/kg	ND	ND	ND	ND	ND	ND
2,4-Dinitrophenol	ug/kg	ND	ND	ND	ND	ND	ND
4-Nitrophenol	ug/kg	ND	ND	ND	ND	ND	ND
2,4-Dinitrotoluene	ug/kg	ND	ND	ND	ND	ND	ND
Diethylphthalate	ug/kg	ND	ND	ND	ND	ND	ND
4-Chlorophenyl-PhenylEther	ug/kg	ND	ND	ND	ND	ND	ND
Fluorene	ug/kg	ND	ND	ND	ND	ND	ND
4,6-Dinitro-2-Methylphenol	ug/kg	ND	ND	ND	ND	ND	ND

TABLE 2a

SUMMARY OF SOIL SAMPLES ORGANIC ANALYSES

AMOCO JOLIET LANDFILL RI/FS

Field ID:		SB05-0-1	SB05-7-10	SB06-0-1	SB06-7-10	SB54-0-1	SB55-7-10
Sample ID:		9670-005	9704-005	9670-006	9704-007	9670-007	9704-006
Date Collected :		25-Oct-95	31-Oct-95	25-Oct-95	31-Oct-95	25-Oct-95	31-Oct-95
	Units						
SEMI-VOLATILES (CONT)							
n-Nitrosodiphenylamine	ug/kg	ND	ND	ND	ND	ND	ND
4-Bromophenyl-Phenyl Ether	ug/kg	ND	ND	ND	ND	ND	ND
Hexachlorobenzene	ug/kg	ND	ND	ND	ND	ND	ND
Pentachlorophenol	ug/kg	ND	ND	ND	ND	ND	ND
Phenanthrene	ug/kg	ND	ND	ND	ND	ND	ND
Anthracene	ug/kg	ND	ND	ND	ND	ND	ND
Di-n-Butylphthalate	ug/kg	ND	190 J	ND	ND	ND	ND
Fluoranthene	ug/kg	ND	ND	ND	ND	ND	ND
Pyrene	ug/kg	ND	ND	ND	ND	ND	ND
ButylBenzylPhthalate	ug/kg	ND	ND	ND	ND	ND	ND
3,3'-Dichlorobenzidine	ug/kg	ND	ND	ND	ND	ND	ND
Benzo(a)Anthracene	ug/kg	ND	ND	ND	ND	ND	ND
Chrysene	ug/kg	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)Phthalate	ug/kg	ND	ND	ND	ND	ND	ND
di-N-OctylPhthalate	ug/kg	ND	ND	ND	61 J	ND	ND
Benzo(b)Fluoranthene	ug/kg	ND	ND	ND	ND	ND	ND
Benzo(k)Fluoranthene	ug/kg	ND	ND	ND	ND	ND	ND
Benzo(a)Pyrene	ug/kg	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-CD)Pyrene	ug/kg	ND	ND	ND	ND	ND	ND
Dibenz(a,h)Anthracene	ug/kg	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)Perylene	ug/kg	ND	ND	ND	ND	ND	ND

TABLE 2a

SUMMARY OF SOIL SAMPLES ORGANIC ANALYSES

AMOCO JOLIET LANDFILL RI/FS

Field ID:		SB01-0-1	SB01-8-10	SB02-0-1	SB02-0-1 DUP	SB02-8-12	SB03-0-1	SB03-7-10
Date Collected :		Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95
	Units							
ORGANIC ACIDS								
Maleic Acid	ug/ml	ND	ND	ND	ND	ND	ND	ND
Trimellitic Acid	ug/ml	0.2	ND	ND	ND	ND	ND	0.74
Phthalic Acid	ug/ml	ND	ND	ND	ND	ND	ND	5.9
Terephthalic Acid	ug/ml	0.13	ND	ND	ND	0.29	ND	0.63
Isophthalic Acid	ug/ml	ND	ND	ND	ND	1.2	ND	5.32
Benzoic Acid	ug/ml	0.25	ND	ND	ND	ND	ND	7.08

Field ID:		SB04-0-1	SB04-2-6	SB04-2-6 DUP	SB05-0-1	SB05-7-10	SB06-0-1	SB06-7-10
Date Collected :		Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95	Oct-95
	Units							
ORGANIC ACIDS								
Maleic Acid	ug/ml	ND	ND	ND	ND	ND	ND	0.55
Trimellitic Acid	ug/ml	ND	ND	ND	ND	ND	ND	ND
Phthalic Acid	ug/ml	ND	0.48	0.5	ND	ND	ND	ND
Terephthalic Acid	ug/ml	ND	0.6	0.6	ND	ND	ND	ND
Isophthalic Acid	ug/ml	ND	1.93	2.08	ND	ND	ND	ND
Benzoic Acid	ug/ml	ND	ND	ND	ND	ND	ND	ND

TABLE 2a
SUMMARY OF SOIL SAMPLES ORGANIC ANALYSES
AMOCO JOLIET LANDFILL RI/FS

Field ID:		RSB06-0-1	RSB06-0-1 DUP	SB54-0-1	SB55-7-10
Date Collected :		Oct-95	Oct-95	Oct-95	Oct-95
	Units				
ORGANIC ACIDS					
Maleic Acid	ug/ml	ND	ND	ND	ND
Trimellitic Acid	ug/ml	ND	ND	ND	ND
Phthalic Acid	ug/ml	ND	ND	ND	ND
Terephthalic Acid	ug/ml	ND	ND	ND	ND
Isophthalic Acid	ug/ml	ND	ND	ND	ND
Benzoic Acid	ug/ml	ND	ND	ND	ND

TABLE 2a

SUMMARY OF SOIL SAMPLES ORGANIC ANALYSES

AMOCO JOLIET LANDFILL RI/FS

Field ID:		SB01-0-1	SB01-8-10	SB02-0-1	SB02-8-12	SB03-0-1	SB03-7-10	SB04-0-1
Sample ID:		9670-001	9704-001	9670-002	9704-002	9670-003	9704-003	9670-004
Date Collected :		25-Oct-95	1-Nov-96	25-Oct-95	31-Oct-95	25-Oct-95	31-Oct-95	25-Oct-95
Parameter	Units							
PESTICIDES/PCBS								
alpha-BHC	ug/kg	ND	ND	ND	ND	ND	ND	ND
beta-BHC	ug/kg	ND	ND	ND	ND	ND	ND	ND
delta-BHC	ug/kg	27 J	ND	ND	ND	ND	ND	2.8
gamma-BHC (Lindane)	ug/kg	ND	ND	ND	ND	ND	ND	ND
Heptachlor	ug/kg	39 J	ND	ND	ND	ND	ND	ND
Aldrin	ug/kg	140 J	ND	ND	ND	ND	ND	ND
Heptachlor Epoxide	ug/kg	ND	ND	ND	ND	ND	ND	ND
Endosulfan I	ug/kg	ND	ND	ND	ND	ND	ND	ND
Dieldrin	ug/kg	ND	ND	ND	ND	ND	ND	ND
4,4'-DDE	ug/kg	ND	ND	ND	ND	ND	ND	ND
Endrin	ug/kg	ND	ND	ND	ND	ND	ND	ND
Endosulfan II	ug/kg	ND	ND	ND	ND	ND	ND	ND
4,4'-DDD	ug/kg	ND	ND	ND	ND	ND	ND	ND
Endosulfan Sulfate	ug/kg	ND	ND	ND	ND	ND	ND	ND
4,4'-DDT	ug/kg	ND	ND	ND	ND	ND	ND	[illegible]
Methoxychlor	ug/kg	ND	ND	ND	ND	ND	ND	ND
Endrin Ketone	ug/kg	ND	ND	ND	ND	ND	ND	ND
Endrin Aldehyde	ug/kg	ND	ND	ND	ND	ND	ND	ND
Alpha-Chlordane	ug/kg	ND	ND	ND	ND	ND	ND	ND
Gamma-Chlordane	ug/kg	ND	ND	ND	ND	ND	ND	ND
Toxaphene	ug/kg	ND	ND	ND	ND	ND	ND	ND
Aroclor-1016	ug/kg	ND	ND	ND	ND	ND	ND	ND
Aroclor-1221	ug/kg	ND	ND	ND	ND	ND	ND	ND
Aroclor-1232	ug/kg	ND	ND	ND	ND	ND	ND	ND
Aroclor-1242	ug/kg	ND	ND	ND	ND	ND	ND	ND
Aroclor-1248	ug/kg	9300 J	200	210	410	55 J	ND	ND
Aroclor-1254	ug/kg	4500 J	180 J	100 J	340 J	67 J	ND	ND
Aroclor-1260	ug/kg	1300 J	ND	ND	53 J	ND	ND	ND

TABLE 2a

SUMMARY OF SOIL SAMPLES ORGANIC ANALYSES

AMOCO JOLIET LANDFILL RI/FS

Field ID:		SB04-2-6	SB05-0-1	SB05-7-10	SB06-0-1	SB06-7-10	SB54-0-1	SB55-7-10
Sample ID:		9704-004	9670-005	9704-005	9670-006	9704-007	9670-007	9704-006
Date Collected :		31-Oct-95	25-Oct-95	31-Oct-95	25-Oct-95	31-Oct-95	25-Oct-95	31-Oct-95
Parameter	Units							
PESTICIDES/PCBS								
alpha-BHC	ug/kg	ND	ND	ND	ND	ND	ND	ND
beta-BHC	ug/kg	ND	ND	ND	ND	ND	ND	ND
delta-BHC	ug/kg	ND	ND	ND	ND	ND	2.2 J	ND
gamma-BHC (Lindane)	ug/kg	ND	ND	ND	ND	ND	ND	ND
Heptachlor	ug/kg	ND	ND	ND	ND	ND	ND	ND
Aldrin	ug/kg	ND	ND	ND	ND	ND	ND	ND
Heptachlor Epoxide	ug/kg	ND	ND	ND	ND	ND	ND	ND
Endosulfan I	ug/kg	ND	ND	ND	ND	ND	ND	ND
Dieldrin	ug/kg	ND	ND	ND	ND	ND	ND	ND
4,4'-DDE	ug/kg	ND	ND	ND	ND	ND	ND	ND
Endrin	ug/kg	ND	ND	ND	ND	ND	ND	ND
Endosulfan II	ug/kg	ND	ND	ND	ND	ND	ND	ND
4,4'-DDD	ug/kg	ND	ND	ND	ND	ND	ND	ND
Endosulfan Sulfate	ug/kg	ND	ND	ND	ND	ND	ND	ND
4,4'-DDT	ug/kg	ND	ND	ND	ND	ND	ND	ND
Methoxychlor	ug/kg	ND	ND	ND	ND	ND	ND	ND
Endrin Ketone	ug/kg	ND	ND	ND	ND	ND	ND	ND
Endrin Aldehyde	ug/kg	ND	ND	ND	ND	ND	ND	ND
Alpha-Chlordane	ug/kg	ND	ND	ND	ND	ND	ND	ND
Gamma-Chlordane	ug/kg	ND	ND	ND	ND	ND	ND	ND
Toxaphene	ug/kg	ND	ND	ND	ND	ND	ND	ND
Aroclor-1016	ug/kg	ND	ND	ND	ND	ND	ND	ND
Aroclor-1221	ug/kg	ND	ND	ND	ND	ND	ND	ND
Aroclor-1232	ug/kg	ND	ND	ND	ND	ND	ND	ND
Aroclor-1242	ug/kg	ND	ND	ND	ND	ND	ND	ND
Aroclor-1248	ug/kg	ND	54	ND	ND	ND	ND	ND
Aroclor-1254	ug/kg	ND	ND	ND	ND	ND	ND	ND
Aroclor-1260	ug/kg	ND	ND	ND	ND	ND	ND	ND

TABLE 2b
SUMMARY OF SOIL SAMPLES INORGANIC ANALYSES
AMOCO JOLIET LANDFILL RI/FS

Field ID:		SB01-0-1	SB01-8-10	SB02-0-1	SB02-8-12	SB03-0-1	SB03-7-10
Sample ID:		9670-001	9704-001	9670-002	9704-002	9670-003	9704-003
Date Collected :		25-Oct-95	1-Nov-96	25-Oct-95	31-Oct-95	25-Oct-95	31-Oct-95
	Units						
INORGANIC (TOTAL)							
Arsenic	mg/kg	8.8	7.5	4.1	8.4	8.6	8.1
Barium	mg/kg	60.3	33.6 B	48.0	116	27.3 B	35.9 B
Beryllium	mg/kg	1.0 B	0.54 B	0.54 B	1.0 B	0.57 B	0.70 B
Cadmium	mg/kg	2.1	1.1	1.4	1.4	1.4	0.76 B
Chromium	mg/kg	204	10.5	28.2	18.9	15.8	12.1
Cobalt	mg/kg	2170	15.0	55.0	12.2	74.1	360.0
Copper	mg/kg	31.3	16.8	15.4	18.1	22.8	22.1
Iron	mg/kg	15700 J	16600 J	10100 J	20600 J	15200 J	21100 J
Lead	mg/kg	29.1	8.5	1534.0	20.5	14.4	9.0
Manganese	mg/kg	1780.0	661	514	826	567	1440.0
Mercury	mg/kg	0.18	0.06 B	ND	0.17	0.07 B	0.08 B
Nickel	mg/kg	74.6	13.7	9.0	18.2	14.4	28.5
Selenium	mg/kg	ND	ND	ND	1.2	ND	ND
Silver	mg/kg	ND	ND	ND	ND	ND	ND
Zinc	mg/kg	1200	120	73.0	73.2	73.1	59.6
Cyanide	mg/kg	0.17 B	ND	ND	0.19 B	ND	ND

TABLE 2b

SUMMARY OF SOIL SAMPLES INORGANIC ANALYSES

AMOCO JOLIET LANDFILL RI/FS

Field ID:		SB04-0-1	SB04-2-6	SB05-0-1	SB05-7-10	SB06-0-1	SB06-7-10
Sample ID:		9670-004	9704-004	9670-005	9704-005	9670-006	9704-007
Date Collected :		25-Oct-95	31-Oct-95	25-Oct-95	31-Oct-95	25-Oct-95	31-Oct-95
	Units						
INORGANIC (TOTAL)							
Arsenic	mg/kg	7.8	9.6	9.4	22.0	7.0	3.7
Barium	mg/kg	33.0 B	64.8	66.6	161	151	11.7 B
Beryllium	mg/kg	0.77 B	0.74 B	0.70 B	1.7	0.77 B	0.70 B
Cadmium	mg/kg	0.83 B	ND	1.1 B	ND	1.4	2.9 B
Chromium	mg/kg	16.9	13.8	17.0	32.1	17.8	6.0 B
Cobalt	mg/kg	100	16.5	187.0	10.8 B	38.6	ND
Copper	mg/kg	23.4	19.9	19.7	27.4	12.0	21.0 B
Iron	mg/kg	20100 J	20600 J	20000 J	41900 J	15600 J	9730 J
Lead	mg/kg	12.2	13.0	15.3	23.5	24.0	5.6
Manganese	mg/kg	492	627.0	842.0	1070	1410	523
Mercury	mg/kg	0.07 B	0.10 B	0.09 B	0.10 B	0.09 B	ND
Nickel	mg/kg	23.7	16.8	21.4	42.2	16.0	ND
Selenium	mg/kg	ND	ND	ND	0.79 B	0.75 B	ND
Silver	mg/kg	ND	ND	ND	ND	ND	ND
Zinc	mg/kg	66.5	63.2	74.6	117	66.7	26.5
Cyanide	mg/kg	ND	ND	ND	ND	ND	ND

TABLE 2b

SUMMARY OF SOIL SAMPLES INORGANIC ANALYSES

AMOCO JOLIET LANDFILL RI/FS

Field ID:		SB54-0-1	SB55-7-10
Sample ID:		9670-007	9704-006
Date Collected:		25-Oct-95	31-Oct-95
	Units		
INORGANIC (TOTAL)			
Arsenic	mg/kg	9.4	16.1
Barium	mg/kg	36.1 B	142
Beryllium	mg/kg	0.82 B	1.5
Cadmium	mg/kg	0.76 B	ND
Chromium	mg/kg	18.3	27.8
Cobalt	mg/kg	148	10.5 B
Copper	mg/kg	26.2	21.6
Iron	mg/kg	22000 J	38600 J
Lead	mg/kg	13.7	19.1
Manganese	mg/kg	561	972
Mercury	mg/kg	ND	0.12 B
Nickel	mg/kg	25.1	31.3
Selenium	mg/kg	1.1 B	ND
Silver	mg/kg	ND	ND
Zinc	mg/kg	64.0	103
Cyanide	mg/kg	ND	ND

TABLE 2b

SUMMARY OF SOIL SAMPLES INORGANIC ANALYSES

AMOCO JOLIET LANDFILL RI/FS

Field ID:		SB01-0-1
Sample ID:		9670-001
Date Collected :		25-Oct-95
	Units	
INORGANIC (TCLP)		
Chromium	mg/L	43.1

TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION		620 Standards	A1-1[2]	A2-1[2]	A7-1[2]	A8A-1[2]	A9-1[2]	A10-1	A11-1
Parameter	Units	Class I[1]							
VOLATILES									
Chloromethane	ug/l		ND	ND	ND	ND	ND	ND	ND
Chloroethane	ug/l		ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ug/l	5	ND	ND	ND	ND	ND	ND	ND
Acetone	ug/l		39 J	50 R	50 R	37 J	ND	ND	ND
Carbon Disulfide	ug/l		0.5 J	ND	ND	ND	78 J	ND	5 R
Chloroform	ug/l		ND	ND	ND	ND	0.4 J	ND	ND
2-Butanone	ug/l		5 R	50 R	50 R	250 R	ND	ND	ND
Carbon Tetrachloride	ug/l	5	ND	ND	ND	ND	5 R	ND	5 R
Bromodichloromethane	ug/l		ND	ND	ND	ND	ND	ND	ND
Benzene	ug/l	5	ND	36	13	ND	ND	ND	ND
4 Methyl-2-Pentanone	ug/l		ND	ND	ND	18 J	4	ND	ND
2-Hexanone	ug/l		ND	ND	ND	ND	ND	ND	ND
Toluene	ug/l	1000	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	ug/l	100	ND	ND	ND	20 J	ND	ND	ND
EthylBenzene	ug/l	700	ND	250	ND	ND	ND	ND	ND
Xylene (total)	ug/l	10000	ND	1200	ND	600	3	ND	ND
1 2-Dibromo 3 chloropropane	ug/l		ND	ND	230 J	64 J	8	ND	ND
			ND	ND	ND	ND	ND	ND	ND

1 These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA

2 Comparison to Class I (35 IAC 620.410) may not be applicable to these wells completed within the landfilled areas. Class IV (35 IAC 620.440) may be appropriate

3 Data Qualifiers J indicates estimated value, R indicates data rejected during validation. Refer to Appendix J for a Summary of Data Validation.

TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION			A12-1	D2-1	D3-1	EG307-1[2]	MW-11-87-1	MW-12-87-1
Parameter	Units	620 Standards Class I[1]						
VOLATILES								
Chloromethane	ug/l		ND	ND	ND	ND	ND	ND
Chloroethane	ug/l		ND	ND	ND	ND	ND	15 J
Methylene Chloride	ug/l	5	ND	ND	ND	ND	ND	ND
Acetone	ug/l		5 R	ND	ND	ND	5 R	ND
Carbon Disulfide	ug/l		ND	ND	ND	0.2 J	ND	ND
Chloroform	ug/l		ND	ND	ND	ND	ND	ND
2-Butanone	ug/l		5 R	5 R	5 R	5 R	5 R	ND
Carbon Tetrachloride	ug/l	5	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ug/l		ND	ND	ND	ND	ND	ND
Benzene	ug/l	5	ND	ND	ND	0.4 J	ND	5
4-Methyl-2-Pentanone	ug/l		ND	ND	ND	5 J	ND	ND
2-Hexanone	ug/l		ND	ND	ND	5 J	ND	ND
Toluene	ug/l	1000	ND	0.4 J	ND	ND	ND	0.3 J
Chlorobenzene	ug/l	100	ND	ND	ND	0.5 J	0.7 J	ND
EthylBenzene	ug/l	700	ND	ND	ND	340	ND	19 J
Xylene (total)	ug/l	10000	ND	ND	ND	9	ND	96
1,2-Dibromo-3-chloropropane	ug/l		ND	ND	ND	ND	ND	ND

1 These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA.

2 Comparison to Class I (35 IAC 620.410) may not be applicable to these wells completed within the landfilled areas. Class IV (35 IAC 620.440) may be appropriate.

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TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION			MW-13-87-1	MW-13-587-1	MW-30-87-1	MW-31-87-1
Parameter	Units	620 Standards Class I[1]				
VOLATILES						
Chloromethane	ug/l		ND	ND	ND	ND
Chloroethane	ug/l		ND	ND	ND	ND
Methylene Chloride	ug/l	5	ND	ND	ND	ND
Acetone	ug/l		50000 R	25000 R	ND	ND
Carbon Disulfide	ug/l		ND	ND	ND	ND
Chloroform	ug/l		ND	ND	ND	ND
2-Butanone	ug/l		50000 R	25000 R	ND	5 R
Carbon Tetrachloride	ug/l	5	ND	ND	ND	ND
Bromodichloromethane	ug/l		ND	ND	ND	ND
Benzene	ug/l	5	ND	ND	ND	ND
4-Methyl-2-Pentanone	ug/l		ND	ND	ND	ND
2-Hexanone	ug/l		ND	ND	ND	5 R
Toluene	ug/l	1000	ND	ND	ND	ND
Chlorobenzene	ug/l	100	ND	ND	ND	ND
EthylBenzene	ug/l	700	ND	ND	ND	ND
Xylene (total)	ug/l	10000	86000 J	91000 J	ND	0.5 J
1,2-Dibromo-3-chloropropane	ug/l		ND	ND	ND	ND

1 These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA

2 Comparison to Class I (35 IAC 620.410) may not be applicable to these wells completed within the landfilled areas. Class IV (35 IAC 620.440) may be appropriate.

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TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION			MW-40-88-1[2]	MW-41-88-1[2]	MW-42-88-1[2]	MW-43-88-1[2]	MW-43-588-1[2]	MW-44-88-1[2]
Parameter	Units	620 Standards Class I[1]						
VOLATILES								
Chloromethane	ug/l		ND	ND	ND	ND	ND	ND
Chloroethane	ug/l		ND	ND	ND	ND	ND	ND
Methylene Chloride	ug/l	5	ND	ND	ND	ND	ND	ND
Acetone	ug/l		120 R	5 R	5 R	50 R	ND	56 J
Carbon Disulfide	ug/l		ND	ND	ND	ND	ND	ND
Chloroform	ug/l		ND	ND	ND	ND	ND	ND
2-Butanone	ug/l		120 R	5 R	5 R	50 R	50 R	50 R
Carbon Tetrachloride	ug/l	5	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ug/l		ND	ND	ND	ND	ND	ND
Benzene	ug/l	5	6 J	ND	ND	5 J	6 J	4 J
4-Methyl-2-Pentanone	ug/l		ND	ND	ND	ND	ND	ND
2-Hexanone	ug/l		ND	ND	ND	ND	ND	ND
Toluene	ug/l	1000	5 J	ND	ND	ND	ND	ND
Chlorobenzene	ug/l	100	ND	ND	ND	ND	ND	ND
EthylBenzene	ug/l	700	350	ND	ND	97	120 J	150
Xylene (total)	ug/l	10000	83	ND	ND	48 J	53 J	130 J
1,2 Dibromo-3-chloropropane	ug/l		ND	ND	ND	ND	ND	ND

1 These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA.

2 Comparison to Class I (35 IAC 620.410) may not be applicable to these wells completed within the landfilled areas. Class IV (35 IAC 620.440) may be appropriate.

3 Data Qualifiers: J indicates estimated value, R indicates data rejected during validation. Refer to Appendix J for a Summary of Data Validation

TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION			MW-45-88-1[2]	MW-46-88-1	MW-47-88-1[2]	MW-48-88-1[2]	MW-49-88-1	MW-50-88-1[2]	MW-51-89-1
Parameter	Units	620 Standards Class I[1]							
VOLATILES									
Chloromethane	ug/l		ND	ND	ND	ND	ND	ND	ND
Chloroethane	ug/l		ND	ND	ND	ND	ND	1	ND
Methylene Chloride	ug/l	5	ND	ND	ND	ND	1 J	3	2 J
Acetone	ug/l		ND	ND	79 J	ND	5 R	5 R	5 R
Carbon Disulfide	ug/l		ND	ND	ND	ND	ND	ND	ND
Chloroform	ug/l		ND	ND	ND	ND	ND	ND	ND
2-Butanone	ug/l		ND	ND	10 J	5 R	5 R	5 R	5 R
Carbon Tetrachloride	ug/l	5	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ug/l		ND	ND	ND	ND	ND	ND	ND
Benzene	ug/l	5	ND	0.4 J	ND	2 J	ND	ND	ND
4-Methyl-2-Pentanone	ug/l		ND	ND	ND	ND	ND	ND	ND
2-Hexanone	ug/l		ND	ND	ND	ND	ND	ND	ND
Toluene	ug/l	1000	ND	ND	7	ND	ND	ND	ND
Chlorobenzene	ug/l	100	ND	8	ND	ND	ND	ND	ND
EthylBenzene	ug/l	700	ND	ND	ND	ND	ND	ND	ND
Xylene (total)	ug/l	10000	0.4 J	ND	ND	7 J	ND	ND	ND
1,2-Dibromo-3-chloropropane	ug/l		ND	ND	ND	ND	ND	ND	ND

1 These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA.

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TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION			MW-52-89-1[2]	MW-53-89-1	MW-54-89-1[2]	MW-54-589-1[2]	MW-55-89-1[2]	MW-56-89-1[2]	MW-57-89-1
Parameter	Units	620 Standards Class I[1]							
VOLATILES									
Chloromethane	ug/l		ND	ND	ND	ND	ND	ND	ND
Chloroethane	ug/l		ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ug/l	5	ND	ND	ND	ND	ND	2 R	ND
Acetone	ug/l		ND	ND	5 R	5 R	64 J	ND	25 J
Carbon Disulfide	ug/l		ND	ND	0.3 J	ND	ND	0.4 J	ND
Chloroform	ug/l		ND	ND	ND	ND	ND	ND	ND
2-Butanone	ug/l		50 R	ND	5 R	5 R	100 R	5 R	5 R
Carbon Tetrachloride	ug/l	5	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ug/l		ND	ND	ND	ND	ND	ND	ND
Benzene	ug/l	5	3 J	0.4 J	0.2 J	ND	8 J	1	0.2 J
4-Methyl-2-Pentanone	ug/l		ND	ND	ND	ND	ND	ND	ND
2-Hexanone	ug/l		ND	ND	5 R	ND	ND	ND	ND
Toluene	ug/l	1000	ND	ND	ND	ND	5 J	ND	ND
Chlorobenzene	ug/l	100	ND	8	ND	ND	ND	ND	13
EthylBenzene	ug/l	700	170	ND	ND	ND	360	0.6 J	ND
Xylene (total)	ug/l	10000	42 J	ND	4	4	190 J	0.8 J	ND
1,2-Dibromo-3-chloropropane	ug/l		ND	ND	ND	ND	ND	ND	ND

1 These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA

2 Comparison to Class I (35 IAC 620.410) may not be applicable to these wells completed within the landfilled areas. Class IV (35 IAC 620.440) may be appropriate.

3 Data Qualifiers: J indicates estimated value, R indicates data rejected during validation. Refer to Appendix J for a Summary of Data Validation.

TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION			MW-58-89-1[2]	MW-59-89-1[2]	MW-60-89-1[2]	MW-61-89-1[2]	MW-62-89-1	MW-63R-94-1
Parameter	Units	620 Standards Class I[1]						
VOLATILES								
Chloromethane	ug/l		ND	ND	ND	ND	ND	ND
Chloroethane	ug/l		ND	ND	ND	ND	ND	ND
Methylene Chloride	ug/l	5	ND	ND	ND	ND	ND	ND
Acetone	ug/l		5 R	5 R	ND	ND	ND	ND
Carbon Disulfide	ug/l		ND	ND	0.6 J	0.5 J	ND	ND
Chloroform	ug/l		ND	ND	ND	ND	ND	ND
2-Butanone	ug/l		5 R	5 R	5 R	5 R	ND	5 R
Carbon Tetrachloride	ug/l	5	ND	0.5 J	ND	ND	ND	ND
Bromodichloromethane	ug/l		ND	ND	ND	ND	ND	ND
Benzene	ug/l	5	ND	ND	0.6 J	1	1	ND
4 Methyl 2-Pentanone	ug/l		ND	ND	ND	ND	ND	ND
2-Hexanone	ug/l		ND	ND	ND	ND	ND	ND
Toluene	ug/l	1000	ND	ND	ND	ND	ND	ND
Chlorobenzene	ug/l	100	ND	ND	55	0.4 J	0.8 J	ND
EthylBenzene	ug/l	700	ND	ND	ND	ND	6	ND
Xylene (total)	ug/l	10000	ND	ND	ND	ND	45	ND
1,2 Dibromo-3-chloropropane	ug/l		ND	ND	ND	ND	ND	ND

1. These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA
2. Comparison to Class I (35 IAC 620.410) may not be applicable to these wells completed within the landfilled areas. Class IV (35 IAC 620.440) may be appropriate.
3. Data Qualifiers: J indicates estimated value, R indicates data rejected during validation. Refer to Appendix J for a Summary of Data Validation

SAMPLE LOCATION			MW-64-89-1	MW-64-589-1	MW-65-89-1	MW-66-89-1	MW-67-89-1	MW-68-89-1	MW-68-589-1
Parameter	Units	620 Standards Class 1[1]							
VOLATILES									
Chloromethane	ug/l		ND	ND	ND	ND	ND	ND	ND
Chloroethane	ug/l		ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ug/l	5	ND	ND	ND	ND	ND	ND	ND
Acetone	ug/l		ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide	ug/l		ND	ND	1	ND	ND	ND	ND
Chloroform	ug/l		ND	ND	ND	ND	ND	ND	ND
2 Butanone	ug/l		5 R	5 R	3 J	5 R	5 R	5 R	5 R
Carbon Tetrachloride	ug/l	5	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ug/l		ND	ND	ND	ND	ND	ND	ND
Benzene	ug/l	5	0.3 J	0.3 J	ND	ND	ND	ND	ND
4-Methyl-2 Pentanone	ug/l		ND	ND	ND	ND	ND	ND	ND
2 Hexanone	ug/l		ND	ND	ND	ND	ND	ND	ND
Toluene	ug/l	1000	ND	ND	0.4 J	ND	ND	ND	ND
Chlorobenzene	ug/l	100	ND	ND	ND	ND	ND	ND	ND
EthylBenzene	ug/l	700	ND	ND	ND	ND	ND	ND	ND
Xylene (total)	ug/l	10000	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane	ug/l		ND	ND	ND	ND	ND	ND	ND

1 These values represent standards for Class I groundwater under 35 IAC 620.410 Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA

2 Comparison to Class I (35 IAC 620.410) may not be applicable to these wells completed within the landfilled areas. Class IV (35 IAC 620.440) may be appropriate

3 Data Qualifiers: J indicates estimated value, R indicates data rejected during validation Refer to Appendix J for a Summary of Data Validation

TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION			MW-69-90-1	MW-70-90-1
Parameter	Units	620 Standards Class I[1]		
VOLATILES				
Chloromethane	ug/l		ND	ND
Chloroethane	ug/l		ND	ND
Methylene Chloride	ug/l	5	ND	ND
Acetone	ug/l		ND	ND
Carbon Disulfide	ug/l		ND	ND
Chloroform	ug/l		ND	ND
2-Butanone	ug/l		ND	ND
Carbon Tetrachloride	ug/l	5	ND	ND
Bromodichloromethane	ug/l		ND	ND
Benzene	ug/l	5	ND	ND
4-Methyl-2-Pentanone	ug/l		ND	ND
2-Hexanone	ug/l		ND	ND
Toluene	ug/l	1000	ND	0 3 J
Chlorobenzene	ug/l	100	ND	ND
EthylBenzene	ug/l	700	ND	ND
Xylene (total)	ug/l	10000	ND	ND
1,2-Dibromo-3-chloropropane	ug/l		ND	ND

1 These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA

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TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION	Units	620 Standards Class I[1]	A1-1[2]	A2-1[2]	A7-1[2]	A8A-1[2]	A9-1[2]
SEMI-VOLATILES							
Phenol	ug/l	100	ND	ND	ND	3200	73
2-Chlorophenol	ug/l		ND	ND	ND	ND	ND
2-Nitrophenol	ug/l		ND	ND	ND	ND	ND
2,4-Dimethylphenol	ug/l		ND	ND	ND	ND	ND
2,4-Dichlorophenol	ug/l		ND	ND	ND	ND	ND
Naphthalene	ug/l		ND	270	13	570 J	16
4-Chloro-3-Methylphenol	ug/l		ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	ug/l		ND	ND	ND	ND	ND
Azobenzene	ug/l		ND	ND	ND	ND	ND
Acenaphthene	ug/l		ND	ND	ND	ND	ND
2,4-Dinitrophenol	ug/l		ND	ND	ND	ND	ND
4-Nitrophenol	ug/l		ND	ND	ND	ND	ND
Diethylphthalate	ug/l		ND	ND	ND	ND	ND
Fluorene	ug/l		ND	ND	ND	ND	ND
4,6-Dinitro-2-Methylphenol	ug/l		ND	ND	ND	ND	ND
Pentachlorophenol	ug/l	1	ND	ND	ND	ND	ND
Phenanthrene	ug/l		2J	ND	ND	ND	ND
Di-n-Butylphthalate	ug/l		ND	ND	ND	ND	ND
bis(2-Ethylhexyl)Phthalate	ug/l	6	ND	ND	ND	ND	3 J
di-N-OctylPhthalate	ug/l		ND	ND	ND	ND	ND
Benzo(b)Fluoranthene	ug/l		ND	ND	ND	ND	ND
Benzo(k)Fluoranthene	ug/l		ND	ND	ND	ND	ND
Benzo(a)Pyrene	ug/l		ND	ND	ND	ND	ND
Indeno(1,2,3-CD)Pyrene	ug/l		ND	ND	ND	ND	ND
Dibenz(a,h)Anthracene	ug/l		ND	ND	ND	ND	ND
Benzo(g,h,i)Perylene	ug/l		ND	ND	ND	ND	ND

1 These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA.

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TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION	Units	620 Standards Class I[1]	A10-1	A11-1	A12-1	D2-1	D3-1	EG307-1[2]	MW-11-87-1
SEMI-VOLATILES									
Phenol	ug/l	100	ND	ND	ND	ND	10 R	15	ND
2 Chlorophenol	ug/l		ND	ND	ND	ND	10 R	ND	ND
2-Nitrophenol	ug/l		ND	ND	ND	ND	10 R	ND	ND
2,4-Dimethylphenol	ug/l		ND	ND	ND	ND	10 R	ND	ND
2,4-Dichlorophenol	ug/l		ND	ND	ND	ND	10 R	ND	ND
Naphthalene	ug/l		ND	ND	ND	ND	ND	19	ND
4-Chloro-3-Methylphenol	ug/l		ND	ND	ND	ND	10 R	ND	ND
2,4,6-Trichlorophenol	ug/l		ND	ND	ND	ND	10 R	ND	ND
Azobenzene	ug/l		ND	ND	ND	ND	ND	ND	ND
Acenaphthene	ug/l		ND	ND	ND	ND	ND	ND	ND
2,4-Dinitrophenol	ug/l		ND	ND	ND	ND	25 R	ND	ND
4-Nitrophenol	ug/l		ND	ND	ND	ND	25 R	ND	ND
Diethylphthalate	ug/l		ND	ND	ND	ND	ND	ND	ND
Fluorene	ug/l		ND	ND	ND	ND	ND	ND	ND
4,6-Dinitro-2-Methylphenol	ug/l		ND	ND	ND	ND	25 R	ND	ND
Pentachlorophenol	ug/l	1	ND	ND	ND	ND	25 R	ND	ND
Phenanthrene	ug/l		ND	ND	ND	ND	ND	ND	ND
Di-n-Butylphthalate	ug/l		ND	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)Phthalate	ug/l	6	1 J	ND	ND	2 J	8 J	ND	ND
di N OctylPhthalate	ug/l		ND	ND	ND	ND	ND	ND	ND
Benzo(b)Fluoranthene	ug/l		ND	ND	ND	ND	ND	ND	ND
Benzo(k)Fluoranthene	ug/l		ND	ND	ND	ND	ND	ND	ND
Benzo(a)Pyrene	ug/l		ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-CD)Pyrene	ug/l		ND	ND	ND	ND	ND	ND	ND
Dibenz(a,h)Anthracene	ug/l		ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)Perylene	ug/l		ND	ND	ND	ND	ND	ND	ND

1 These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA

2. Comparison to Class I (35 IAC 620.410) may not be applicable to these wells completed within the landfilled areas. Class IV (35 IAC 620 440) may be appropriate

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TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION	Units	620 Standards Class I[1]	MW-12-87-1	MW-13-87-1	MW-13-587-1	MW-30-87-1	MW-31-87-1	MW-40-88-1[2]	MW-41-88-1[2]
SEMI-VOLATILES									
Phenol	ug/l	100	ND	ND	ND	ND	ND	480	ND
2-Chlorophenol	ug/l		ND	ND	ND	ND	ND	ND	ND
2-Nitrophenol	ug/l		ND	ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	ug/l		ND	61	47	ND	ND	ND	ND
2,4-Dichlorophenol	ug/l		ND	ND	ND	ND	ND	ND	ND
Naphthalene	ug/l		610	ND	ND	ND	ND	21 J	1 J
4-Chloro-3-Methylphenol	ug/l		ND	ND	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	ug/l		ND	ND	ND	ND	ND	ND	ND
Azobenzene	ug/l		ND	ND	ND	ND	ND	ND	ND
Acenaphthene	ug/l		ND	ND	ND	ND	ND	ND	ND
2,4-Dinitrophenol	ug/l		ND	ND	ND	ND	ND	ND	ND
4-Nitrophenol	ug/l		ND	ND	ND	ND	ND	ND	ND
Diethylphthalate	ug/l		ND	ND	ND	ND	ND	ND	10
Fluorene	ug/l		ND	ND	ND	ND	ND	ND	ND
4,6-Dinitro-2-Methylphenol	ug/l		ND	ND	ND	ND	ND	ND	ND
Pentachlorophenol	ug/l	1	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	ug/l		ND	ND	ND	ND	ND	ND	ND
Di-n-Butylphthalate	ug/l		ND	ND	ND	ND	2 J	ND	ND
bis(2-Ethylhexyl)Phthalate	ug/l	6	ND	ND	ND	ND	5 J	ND	ND
di-N-OctylPhthalate	ug/l		ND	ND	ND	ND	2 J	ND	ND
Benzo(b)Fluoranthene	ug/l		ND	ND	ND	ND	ND	ND	ND
Benzo(K)Fluoranthene	ug/l		ND	ND	ND	ND	ND	ND	ND
Benzo(a)Pyrene	ug/l		ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-CD)Pyrene	ug/l		ND	ND	ND	ND	ND	ND	ND
Dibenz(a,h)Anthracene	ug/l		ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)Perylene	ug/l		ND	ND	ND	ND	ND	ND	ND

1 These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA.

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TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION	Units	620 Standards Class I[1]	MW-42-88-1[2]	MW-43-88-1[2]	MW-43-588-1[2]	MW-44-88-1[2]
SEMI-VOLATILES						
Phenol	ug/l	100	ND	ND	ND	ND
2-Chlorophenol	ug/l		ND	ND	ND	ND
2-Nitrophenol	ug/l		ND	ND	ND	ND
2,4-Dimethylphenol	ug/l		ND	20 J	27 J	ND
2,4-Dichlorophenol	ug/l		ND	ND	ND	ND
Naphthalene	ug/l		ND	490	870	2 J
4-Chloro-3-Methylphenol	ug/l		ND	ND	ND	ND
2,4,6-Trichlorophenol	ug/l		ND	ND	ND	ND
Azobenzene	ug/l		ND	ND	ND	1 J
Acenaphthene	ug/l		ND	ND	ND	ND
2,4-Dinitrophenol	ug/l		ND	ND	ND	ND
4-Nitrophenol	ug/l		ND	ND	ND	ND
Diethylphthalate	ug/l		ND	ND	ND	ND
Fluorene	ug/l		ND	ND	ND	ND
4,6-Dinitro-2-Methylphenol	ug/l		ND	ND	ND	ND
Pentachlorophenol	ug/l	1	ND	ND	ND	ND
Phenanthrene	ug/l		ND	ND	ND	ND
Di-n-Butylphthalate	ug/l		ND	ND	ND	ND
bis(2-Ethylhexyl)Phthalate	ug/l	6	ND	ND	ND	ND
di-N-OctylPhthalate	ug/l		ND	ND	ND	10 R
Benzo(b)Fluoranthene	ug/l		ND	ND	ND	10 R
Benzo(k)Fluoranthene	ug/l		ND	ND	ND	10 R
Benzo(a)Pyrene	ug/l		ND	ND	ND	10 R
Indeno(1,2,3-CD)Pyrene	ug/l		ND	ND	ND	10 R
Dibenz(a,h)Anthracene	ug/l		ND	ND	ND	10 R
Benzo(g,h,i)Perylene	ug/l		ND	ND	ND	10 R

1 These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA.

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TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION	Units	620 Standards Class I[1]	MW-45-88-1[2]	MW-46-88-1	MW-47-88-1[2]	MW-48-88-1[2]	MW-49-88-1	MW-50-88-1[2]
SEMI-VOLATILES								
Phenol	ug/l	100	ND	ND	390	ND	ND	8 J
2-Chlorophenol	ug/l		ND	ND	ND	ND	ND	ND
2-Nitrophenol	ug/l		ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	ug/l		ND	ND	ND	ND	ND	ND
2,4-Dichlorophenol	ug/l		ND	ND	ND	ND	ND	ND
Naphthalene	ug/l		ND	ND	ND	ND	ND	ND
4-Chloro-3-Methylphenol	ug/l		ND	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	ug/l		ND	ND	ND	ND	ND	ND
Azobenzene	ug/l		ND	ND	ND	ND	ND	ND
Acenaphthene	ug/l		ND	ND	ND	ND	ND	ND
2,4-Dinitrophenol	ug/l		ND	ND	ND	ND	ND	ND
4-Nitrophenol	ug/l		ND	ND	ND	ND	ND	ND
Diethylphthalate	ug/l		ND	ND	ND	ND	ND	ND
Fluorene	ug/l		ND	ND	ND	ND	ND	ND
4,6-Dinitro-2-Methylphenol	ug/l		ND	ND	ND	ND	ND	ND
Pentachlorophenol	ug/l	1	ND	ND	ND	ND	ND	ND
Phenanthrene	ug/l		ND	ND	ND	ND	ND	ND
Di-n-Butylphthalate	ug/l		ND	1 J	ND	ND	ND	ND
bis(2-Ethylhexyl)Phthalate	ug/l	6	ND	2 J	ND	ND	ND	ND
di-N-OctylPhthalate	ug/l		ND	ND	ND	ND	ND	ND
Benzo(b)Fluoranthene	ug/l		ND	ND	ND	ND	ND	ND
Benzo(k)Fluoranthene	ug/l		ND	ND	ND	ND	ND	ND
Benzo(a)Pyrene	ug/l		ND	ND	ND	ND	ND	ND
Indeno(1,2,3-CD)Pyrene	ug/l		ND	ND	ND	ND	ND	ND
Dibenz(a,h)Anthracene	ug/l		ND	ND	ND	ND	ND	ND
Benzo(g,h,i)Perylene	ug/l		ND	ND	ND	ND	ND	ND

1 These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA

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TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION	Units	620 Standards Class I[1]	MW-51-89-1	MW-52-89-1[2]	MW-53-89-1	MW-54-89-1[2]	MW-54-589-1[2]	MW-55-89-1[2]
SEMI-VOLATILES								
Phenol	ug/l	100	ND	ND	ND	ND	ND	730
2 Chlorophenol	ug/l		ND	ND	ND	ND	ND	ND
2-Nitrophenol	ug/l		ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	ug/l		ND	ND	ND	ND	ND	ND
2,4-Dichlorophenol	ug/l		ND	ND	ND	ND	ND	ND
Naphthalene	ug/l		ND	21	ND	ND	ND	66 J
4-Chloro-3-Methylphenol	ug/l		ND	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	ug/l		ND	ND	ND	ND	ND	ND
Azobenzene	ug/l		ND	ND	ND	ND	ND	ND
Acenaphthene	ug/l		ND	ND	8 J	ND	ND	ND
2,4-Dinitrophenol	ug/l		ND	ND	ND	ND	ND	ND
4-Nitrophenol	ug/l		ND	ND	ND	ND	ND	ND
Diethylphthalate	ug/l		ND	ND	ND	ND	ND	ND
Fluorene	ug/l		ND	ND	2 J	ND	ND	ND
4,6-Dinitro-2-Methylphenol	ug/l		ND	ND	ND	ND	ND	ND
Pentachlorophenol	ug/l	1	ND	ND	ND	ND	ND	ND
Phenanthrene	ug/l		ND	ND	ND	ND	ND	ND
Di-n-Butylphthalate	ug/l		ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)Phthalate	ug/l	6	6 J	ND	4 J	ND	ND	ND
di N-OctylPhthalate	ug/l		ND	ND	ND	ND	ND	ND
Benzo(b)Fluoranthene	ug/l		ND	ND	ND	ND	ND	ND
Benzo(k)Fluoranthene	ug/l		ND	ND	ND	ND	ND	ND
Benzo(a)Pyrene	ug/l		ND	ND	ND	ND	ND	ND
Indeno(1,2,3-CD)Pyrene	ug/l		ND	ND	ND	ND	ND	ND
Dibenz(a,h)Anthracene	ug/l		ND	ND	ND	ND	ND	ND
Benzo(g,h,i)Perylene	ug/l		ND	ND	ND	ND	ND	ND

1 These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i e MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA

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SAMPLE LOCATION	Units	620 Standards Class I[1]	MW-56-89-1[2]	MW-57-89-1	MW-58-89-1[2]	MW-59-89-1[2]	MW-60-89-1[2]	MW-61-89-1[2]
SEMI-VOLATILES								
Phenol	ug/l	100	ND	ND	ND	ND	ND	ND
2 Chlorophenol	ug/l		ND	ND	ND	ND	ND	ND
2-Nitrophenol	ug/l		ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	ug/l		ND	ND	ND	ND	ND	ND
2,4-Dichlorophenol	ug/l		ND	ND	ND	ND	ND	ND
Naphthalene	ug/l		ND	ND	ND	ND	ND	ND
4 Chloro-3-Methylphenol	ug/l		ND	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	ug/l		ND	ND	ND	ND	ND	ND
Azobenzene	ug/l		ND	ND	ND	ND	ND	ND
Acenaphthene	ug/l		ND	ND	ND	ND	ND	ND
2 4 Dinitrophenol	ug/l		ND	ND	ND	ND	ND	ND
4 Nitrophenol	ug/l		ND	ND	ND	ND	ND	ND
Diethylphthalate	ug/l		ND	ND	ND	ND	ND	ND
Fluorene	ug/l		ND	ND	ND	ND	ND	ND
4,6-Dinitro-2-Methylphenol	ug/l		ND	ND	ND	ND	ND	ND
Pentachlorophenol	ug/l	1	ND	ND	ND	ND	ND	ND
Phenanthrene	ug/l		ND	ND	ND	ND	ND	ND
Di-n-Butylphthalate	ug/l		ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)Phthalate	ug/l	6	ND	ND	ND	ND	ND	ND
di-N-OctylPhthalate	ug/l		ND	ND	ND	ND	ND	ND
Benzo(b)Fluoranthene	ug/l		ND	ND	ND	ND	ND	ND
Benzo(k)Fluoranthene	ug/l		ND	ND	ND	ND	ND	ND
Benzo(a)Pyrene	ug/l		ND	ND	ND	ND	ND	ND
Indeno(1,2,3-CD)Pyrene	ug/l		ND	ND	ND	ND	ND	ND
Dibenz(a,h)Anthracene	ug/l		ND	ND	ND	ND	ND	ND
Benzo(g,h,i)Perylene	ug/l		ND	ND	ND	ND	ND	ND

1 These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA.

2 Comparison to Class I (35 IAC 620.410) may not be applicable to these wells completed within the landfilled areas. Class IV (35 IAC 620 440) may be appropriate.

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TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION	Units	620 Standards Class I[1]	MW-62-89-1	MW-63R-94-1	MW-64-89-1	MW-64-589-1	MW-65-89-1	MW-66-89-1	MW-67-89-1
SEMI-VOLATILES									
Phenol	ug/l	100	ND	ND	ND	ND	ND	ND	ND
2 Chlorophenol	ug/l		ND	ND	ND	ND	ND	ND	ND
2-Nitrophenol	ug/l		ND	ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	ug/l		ND	ND	ND	ND	ND	ND	ND
2,4-Dichlorophenol	ug/l		ND	ND	ND	ND	ND	ND	ND
Naphthalene	ug/l		ND	ND	ND	ND	ND	ND	ND
4 Chloro-3-Methylphenol	ug/l		ND	ND	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	ug/l		ND	ND	ND	ND	ND	ND	ND
Azobenzene	ug/l		ND	ND	ND	ND	ND	ND	ND
Acenaphthene	ug/l		ND	ND	ND	ND	ND	ND	ND
2,4-Dinitrophenol	ug/l		ND	ND	ND	ND	ND	ND	ND
4 Nitrophenol	ug/l		ND	ND	ND	ND	ND	ND	ND
Diethylphthalate	ug/l		ND	ND	ND	ND	ND	ND	ND
Fluorene	ug/l		ND	ND	ND	ND	ND	ND	ND
4,6-Dinitro-2-Methylphenol	ug/l		ND	ND	ND	ND	ND	ND	ND
Pentachlorophenol	ug/l	1	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	ug/l		ND	ND	ND	ND	ND	ND	ND
Di-n-Butylphthalate	ug/l		ND	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)Phthalate	ug/l	6	ND	ND	1 J	3 J	ND	1 J	ND
di N-OctylPhthalate	ug/l		ND	ND	ND	ND	ND	ND	ND
Benzo(b)Fluoranthene	ug/l		ND	ND	ND	ND	ND	ND	ND
Benzo(K)Fluoranthene	ug/l		ND	ND	ND	ND	ND	ND	ND
Benzo(a)Pyrene	ug/l		ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-CD)Pyrene	ug/l		ND	ND	ND	ND	ND	ND	ND
Dibenz(a,h)Anthracene	ug/l		ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)Perylene	ug/l		ND	ND	ND	ND	ND	ND	ND

1 These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA.

2 Comparison to Class I (35 IAC 620.410) may not be applicable to these wells completed within the landfilled areas. Class IV (35 IAC 620 440) may be appropriate

3 Data Qualifiers J indicates estimated value, R indicates data rejected during validation. Refer to Appendix J for a Summary of Data Validation.

SAMPLE LOCATION	Units	620 Standards Class I[1]	MW-68-89-1	MW-68-589-1	MW-69-90-1	MW-70-90-1
SEMI-VOLATILES						
Phenol	ug/l	100	ND	ND	ND	ND
2 Chlorophenol	ug/l		ND	ND	ND	ND
2-Nitrophenol	ug/l		ND	ND	ND	ND
2,4-Dimethylphenol	ug/l		ND	ND	ND	ND
2,4-Dichlorophenol	ug/l		ND	ND	ND	ND
Naphthalene	ug/l		ND	ND	ND	ND
4 Chloro-3-Methylphenol	ug/l		ND	ND	ND	ND
2 4,6-Trichlorophenol	ug/l		ND	ND	ND	ND
Azobenzene	ug/l		ND	ND	ND	ND
Acenaphthene	ug/l		ND	ND	ND	ND
2,4-Dinitrophenol	ug/l		ND	ND	ND	ND
4-Nitrophenol	ug/l		ND	ND	ND	ND
Diethylphthalate	ug/l		ND	ND	ND	ND
Fluorene	ug/l		ND	ND	ND	ND
4,6-Dinitro-2-Methylphenol	ug/l		ND	ND	ND	ND
Pentachlorophenol	ug/l	1	ND	ND	ND	ND
Phenanthrene	ug/l		ND	ND	ND	ND
Di-n-Butylphthalate	ug/l		ND	ND	ND	ND
bis(2-Ethylhexyl)Phthalate	ug/l	6	ND	ND	4 J	ND
di-N-OctylPhthalate	ug/l		ND	ND	ND	ND
Benzo(b)Fluoranthene	ug/l		ND	ND	ND	ND
Benzo(k)Fluoranthene	ug/l		ND	ND	ND	ND
Benzo(a)Pyrene	ug/l		ND	ND	ND	ND
Indeno(1,2,3-CD)Pyrene	ug/l		ND	ND	ND	ND
Dibenz(a,h)Anthracene	ug/l		ND	ND	ND	ND
Benzo(g,h,i)Perylene	ug/l		ND	ND	ND	ND

1 These values represent standards for Class I groundwater under 35 IAC 620 410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA.

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TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION	Units	620 Standards Class I[1]	A1-1[2]	A2-1[2]	A7-1[2]	A7-1[2]	A8A-1[2]	A9-1[2]	A10-1
ORGANIC ACIDS									
Trimellitic Acid	ug/ml		ND	ND	0.24	ND	272.8	26.6	ND
Phthalic Acid	ug/ml		1.06	214.3	27.2	27.3	11812	530.8	ND
Terephthalic Acid	ug/ml		1.89	1.79	ND	ND	727.3	27.3	ND
Isophthalic Acid	ug/ml		ND	ND	66	64.7	1044	153.6	ND
Benzoic Acid	ug/ml		11.6	1.01	ND	ND	279.8	ND	ND

SAMPLE LOCATION	Units	620 Standards Class I[1]	A11-1	A11-1	A12-1	D2-1	D3-1	EG307-1[2]	MW-11-87-1
ORGANIC ACIDS									
Trimellitic Acid	ug/ml		ND	ND	ND	ND	ND	12.13	ND
Phthalic Acid	ug/ml		ND	ND	ND	ND	ND	261.8	ND
Terephthalic Acid	ug/ml		ND	ND	ND	ND	ND	11.34	ND
Isophthalic Acid	ug/ml		ND	ND	ND	ND	ND	96.9	ND
Benzoic Acid	ug/ml		ND	ND	1.01	15.2	ND	ND	1.07

1 These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA.

2 Comparison to Class I (35 IAC 620.410) may not be applicable to these wells completed within the landfilled areas. Class IV (35 IAC 620.440) may be appropriate

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TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION	Units	620 Standards Class I[1]	W-12-87-1	MW-13-87-1	MW-13-587-1	MW-30-87-1	MW-30-87-1	MW-40-88-1[2]	MW-41-88-1[2]
ORGANIC ACIDS									
Trimellitic Acid	ug/ml		ND	ND	ND	ND	ND	9.34	0.99
Phthalic Acid	ug/ml		ND	ND	ND	ND	ND	2292	166.1
Terephthalic Acid	ug/ml		1.27	ND	ND	ND	ND	150.2	10.8
Isophthalic Acid	ug/ml		1.9	ND	ND	ND	ND	247.8	220.1
Benzoic Acid	ug/ml		ND	1.08	1	ND	ND	108.7	92.7

SAMPLE LOCATION	Units	620 Standards Class I[1]	MW-42-88-1[2]	MW-42-588-1[2]	MW-43-88-1[2]	MW-44-88-1[2]	MW-45-88-1[2]	W-46-88-1	MW-47-88-1[2]
ORGANIC ACIDS									
Trimellitic Acid	ug/ml		ND	ND	ND	54.1	ND	ND	958.8
Phthalic Acid	ug/ml		ND	1099	1065	1972	ND	ND	9328
Terephthalic Acid	ug/ml		ND	3.44	3.29	2.81	ND	ND	474.7
Isophthalic Acid	ug/ml		ND	ND	74	258.2	0.29	0.49	1430
Benzoic Acid	ug/ml		ND	176.4	169.6	197.5	1.59	ND	990

1 These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA.

2 Comparison to Class I (35 IAC 620.410) may not be applicable to these wells completed within the landfilled areas. Class IV (35 IAC 620.440) may be appropriate

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TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION	Units	620 Standards Class I[1]	MW-48-88-I[2]	MW-49-88-I	MW-50-88-I[2]	MW-50-88-I[2]	MW-51-89-I	MW-52-89-I[2]	MW-53-89-I
ORGANIC ACIDS									
Trimellitic Acid	ug/ml		ND	ND	97.9	102.4	ND	ND	ND
Phthalic Acid	ug/ml		ND	0 26	2870	2993	ND	495.2	ND
Terephthalic Acid	ug/ml		ND	ND	88.9	92.7	ND	3.11	ND
Isophthalic Acid	ug/ml		15.76	ND	237.5	248.9	ND	57.2	0.14
Benzoic Acid	ug/ml		ND	1.2	16.7	20.2	ND	73	ND

SAMPLE LOCATION	Units	620 Standards Class I[1]	MW-54-89-I[2]	MW-54-589-I[2]	MW-55-89-I[2]	MW-56-89-I[2]	MW-57-89-I	MW-58-89-I[2]	MW-58-89-I[2]
ORGANIC ACIDS									
Trimellitic Acid	ug/ml		49.4	49.2	64.2	ND	ND	ND	ND
Phthalic Acid	ug/ml		2486	2498	2727	ND	ND	ND	ND
Terephthalic Acid	ug/ml		ND	3.5	255.4	ND	ND	ND	ND
Isophthalic Acid	ug/ml		200 8	239.4	430.9	7	0.18	ND	ND
Benzoic Acid	ug/ml		31.2	32.1	ND	ND	1.28	1 02	1 05

1 These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA.

2 Comparison to Class I (35 IAC 620.410) may not be applicable to these wells completed within the landfilled areas. Class IV (35 IAC 620.440) may be appropriate.

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SAMPLE LOCATION	Units	620 Standards Class I[1]	MW-59-89-1[2]	MW-60-89-1[2]	MW-61-89-1[2]	MW-62-89-1	MW-63R-94-1	MW-63R-94-1	MW-64-589-1
ORGANIC ACIDS									
Trimellitic Acid	ug/ml		ND	ND	0.51	ND	ND	ND	ND
Phthalic Acid	ug/ml		ND	ND	1390	ND	ND	1.34	ND
Terephthalic Acid	ug/ml		ND	ND	36.3	ND	0.77	0.81	ND
Isophthalic Acid	ug/ml		ND	0 19	307.7	ND	1.05	2 54	ND
Benzoic Acid	ug/ml		1	1 31	33.4	1.02	61.69	62.75	24.23

SAMPLE LOCATION	Units	620 Standards Class I[1]	MW-64-89-1	MW-65-89-1	MW-66-89-1	MW-67-89-1	MW-67-589-1	MW-68-89-1	MW-69-90-1
ORGANIC ACIDS									
Trimellitic Acid	ug/ml		ND	ND	ND	ND	ND	ND	ND
Phthalic Acid	ug/ml		ND	ND	ND	ND	ND	ND	ND
Terephthalic Acid	ug/ml		ND	ND	ND	ND	ND	ND	ND
Isophthalic Acid	ug/ml		ND	ND	ND	ND	ND	ND	ND
Benzoic Acid	ug/ml		24.1	1.46	ND	ND	ND	ND	11.07

1 These values represent standards for Class I groundwater under 35 IAC 620 410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA

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TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION	Units	620 Standards Class I[1]	MW-70-90-1
ORGANIC ACIDS			
Trimellitic Acid	ug/ml		ND
Phthalic Acid	ug/ml		ND
Terephthalic Acid	ug/ml		ND
Isophthalic Acid	ug/ml		ND
Benzoic Acid	ug/ml		14.12

1 These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA

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TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION		620 Standards	A1-1[2]	A2-1[2]	A7-1[2]	A8A-1[2]	A9-1[2]	A10-1	A11-1
Parameter	Units	Class I[1]							
PESTICIDES/PCBS									
beta BHC	ug/l		ND	0.03 R	ND	ND	ND	ND	0.03 R
delta-BHC	ug/l		ND	0.045 R	ND	ND	ND	ND	0.045 R
gamma-BHC (Lindane)	ug/l	0.2	ND	0.02 R	ND	ND	ND	ND	0.02 R
Heptachlor	ug/l	0.4	ND	0.02 J	ND	ND	ND	ND	0.015 R
Aldrin	ug/l		ND	0.02 R	ND	ND	ND	ND	0.02 R
Dieldrin	ug/l		ND	0.01 R	ND	ND	ND	ND	0.01 R
Endosulfan II	ug/l		ND	0.02 R	ND	ND	ND	ND	0.02 R
T Chlordane	ug/l		0.07 J	0.07 R	ND	ND	ND	ND	0.07 R

SAMPLE LOCATION		620 Standards	A12-1	D2-1	D3-1	EG307-1[2]	MW-11-87-1	MW-12-87-1	MW-13-87-1
Parameter	Units	Class I[1]							
PESTICIDES/PCBS									
beta-BHC	ug/l		ND	ND	ND	0.03 R	0.03 R	ND	ND
delta-BHC	ug/l		ND	ND	ND	0.045 R	0.045 R	ND	ND
gamma-BHC (Lindane)	ug/l	0.2	ND	ND	ND	0.02 R	0.02 R	ND	ND
Heptachlor	ug/l	0.4	ND	ND	ND	0.015 R	0.015 R	ND	ND
Aldrin	ug/l		ND	ND	ND	0.02 R	0.02 R	ND	ND
Dieldrin	ug/l		ND	ND	ND	0.01 R	0.01 R	ND	ND
Endosulfan II	ug/l		ND	ND	0.03	0.02 R	0.02 R	ND	ND
T Chlordane	ug/l		ND	ND	ND	0.07 R	0.07 R	ND	ND

1 These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA

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TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION			MW-13-587-1	MW-30-87-1	MW-31-87	MW-40-88-1[2]	MW-41-88-1[2]	MW-42-88-1[2]	MW-43-88-1[2]
Parameter	Units	620 Standards Class I[1]							
PESTICIDES/PCBS									
beta-BHC	ug/l		ND	ND	ND	ND	ND	ND	ND
delta-BHC	ug/l		ND	ND	ND	0.07 J	ND	ND	ND
gamma-BHC (Lindane)	ug/l	0.2	ND	ND	ND	ND	ND	ND	ND
Heptachlor	ug/l	0.4	ND	ND	ND	0.09 J	ND	ND	ND
Aldrin	ug/l		ND	ND	ND	ND	ND	ND	ND
Dieldrin	ug/l		ND	ND	ND	ND	ND	ND	0.37 J
Endosulfan II	ug/l		ND	ND	ND	ND	ND	ND	ND
T Chlordane	ug/l		ND	ND	ND	ND	ND	ND	ND

SAMPLE LOCATION			MW-43-588-1[2]	MW-44-88-1[2]	MW-45-88-1[2]	MW-46-88-1	MW-47-88-1[2]	MW-48-88-1[2]	MW-49-88-1
Parameter	Units	620 Standards Class I[1]							
PESTICIDES/PCBS									
beta-BHC	ug/l		ND	ND	ND	ND	ND	ND	ND
delta-BHC	ug/l		ND	ND	ND	ND	ND	ND	ND
gamma-BHC (Lindane)	ug/l	0.2	ND	ND	ND	ND	ND	ND	ND
Heptachlor	ug/l	0.4	ND	ND	ND	ND	ND	ND	ND
Aldrin	ug/l		ND	ND	ND	ND	ND	ND	ND
Dieldrin	ug/l		0.36 J	ND	ND	ND	ND	ND	ND
Endosulfan II	ug/l		ND	ND	ND	ND	ND	ND	ND
T Chlordane	ug/l		ND	ND	ND	ND	ND	ND	ND

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TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION			MW-50-88-1[2]	MW-51-89-1	MW-52-89-1[2]	MW-53-89-1	MW-54-89-1[2]	MW-54-589-1[2]	MW-55-89-1[2]
Parameter	Units	620 Standards Class I[1]							
PESTICIDES/PCBS									
beta-BHC	ug/l		ND	ND	ND	ND	ND	ND	0.03 J
delta-BHC	ug/l		ND	ND	ND	ND	ND	ND	0.08 J
gamma-BHC (Lindane)	ug/l	0.2	ND	ND	ND	ND	ND	ND	0.06 J
Heptachlor	ug/l	0.4	ND	ND	ND	ND	ND	ND	0.15 J
Aldrin	ug/l		ND	ND	ND	ND	ND	ND	0.05 J
Dieldrin	ug/l		ND	ND	ND	ND	ND	ND	ND
Endosulfan II	ug/l		ND	ND	ND	ND	ND	ND	ND
T Chlordane	ug/l		ND	ND	ND	ND	ND	ND	ND

SAMPLE LOCATION			MW-56-89-1[2]	MW-57-89-1	MW-58-89-1[2]	MW-59-89-1[2]	MW-60-89-1[2]	MW-61-89-1[2]	MW-62-89-1
Parameter	Units	620 Standards Class I[1]							
PESTICIDES/PCBS									
beta-BHC	ug/l		ND	ND	ND	ND	ND	ND	ND
delta-BHC	ug/l		ND	ND	ND	ND	ND	ND	ND
gamma-BHC (Lindane)	ug/l	0.2	ND	ND	ND	ND	ND	ND	ND
Heptachlor	ug/l	0.4	ND	ND	ND	ND	ND	ND	ND
Aldrin	ug/l		ND	ND	ND	ND	ND	ND	ND
Dieldrin	ug/l		ND	ND	ND	ND	ND	ND	ND
Endosulfan II	ug/l		ND	ND	ND	ND	ND	ND	ND
T Chlordane	ug/l		ND	ND	ND	ND	ND	ND	ND

1 These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA.

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TABLE 3a
SUMMARY OF GROUNDWATER ORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION			MW-63R-94-1	MW-64-89-1	MW-64-589-1	MW-65-89-1	MW-66-89-1	MW-67-89-1	MW-68-89-1
Parameter	Units	620 Standards Class I[1]							
PESTICIDES/PCBS									
beta-BHC	ug/l		ND	ND	ND	ND	ND	ND	ND
delta-BHC	ug/l		0.059	0.251	0.084	0.131	0.23	ND	0.186
gamma-BHC (Lindane)	ug/l	0.2	ND	ND	ND	ND	ND	ND	ND
Heptachlor	ug/l	0.4	ND	ND	ND	ND	ND	ND	ND
Aldrin	ug/l		ND	ND	ND	ND	ND	ND	ND
Dieldrin	ug/l		ND	ND	ND	ND	ND	ND	ND
Endosulfan II	ug/l		ND	ND	ND	ND	ND	ND	ND
T Chlordane	ug/l		ND	ND	ND	ND	ND	ND	ND

SAMPLE LOCATION			MW-68-589-1	MW-69-90-1	MW-70-90-1
Parameter	Units	620 Standards Class I[1]			
PESTICIDES/PCBS					
beta-BHC	ug/l		ND	ND	ND
delta-BHC	ug/l		0.248	ND	ND
gamma-BHC (Lindane)	ug/l	0.2	ND	ND	ND
Heptachlor	ug/l	0.4	ND	ND	ND
Aldrin	ug/l		ND	ND	ND
Dieldrin	ug/l		ND	ND	ND
Endosulfan II	ug/l		ND	ND	ND
T Chlordane	ug/l		ND	ND	ND

1 These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA.

2 Comparison to Class I (35 IAC 620.410) may not be applicable to these wells completed within the landfilled areas. Class IV (35 IAC 620.440) may be appropriate

3 Data Qualifiers. J indicates estimated value, R indicates data rejected during validation. Refer to Appendix J for a Summary of Data Validation.

TABLE 3b
SUMMARY OF GROUNDWATER INORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION			A1-1[2]	A2-1[2]	A7-1[2]	A8A-1[2]	A9-1[2]	A10-1
	Units	620 Standards Class I (1)	Total	Total	Total	Total	Total	Total
Arsenic	ug/l	50	80.8	253	40.8	114	730	25.5
Barium	ug/l	2000	409	1310	445	2050	2250	510
Beryllium	ug/l	4	6.1	15.3 B	ND	ND	18.7 B	1.6 B
Cadmium	ug/l	5	ND	ND	ND	ND	27.4	ND
Chromium	ug/l	100	131	389	20.4	31.8 B	369	19.5
Cobalt	ug/l	1000	680	615	335	22700	8510	26.2 B
Copper	ug/l	650	171	398	73.9	ND	1390	ND
Iron	ug/l	5000	169000	511000	58700	959000 J	1020000	41800
Lead	ug/l	7.5	92.8	422	30.5 J	ND	733 J	28.1
Manganese	ug/l	150	2790	8860	2410	111000	37300	1210
Mercury	ug/l	2	ND	0.52	0.45 J	2.4	3.0 J	ND
Nickel	ug/l	100	172	518	36.6 B	ND	801	35.7 B
Selenium	ug/l	50	7.0	7.0	2.7 B	17.9	ND	5.3
Silver	ug/l	50	ND	ND	ND	ND	ND	ND
Zinc	ug/l	5000	542	1220	165 J	139	3250 J	152
Cyanide	ug/l	200	ND	ND	ND	ND	ND	ND

1. These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA.
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TABLE 3b
SUMMARY OF GROUNDWATER INORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION			A11-1	A12-1	D2-1	D3-1	EG307-1[2]	MW-11-87-1
	Units	620 Standards Class I (1)	Total	Total	Total	Total	Total	Total
Arsenic	ug/l	50	5.6 B	3.9 B	22.6	12.4	1440	69.0
Barium	ug/l	2000	82.8 B	137 B	123 B	55.1 B	787	526
Beryllium	ug/l	4	1.0 B	1.1 B	ND	ND	1.8 B	3.7 B
Cadmium	ug/l	5	ND	ND	ND	ND	ND	ND
Chromium	ug/l	100	12.5	5.2 B	23.1	ND	33.6	66.2
Cobalt	ug/l	1000	118	17.3 B	ND	ND	26900	63.8
Copper	ug/l	650	ND	56.1	ND	ND	ND	149
Iron	ug/l	5000	6970	3100	18000 J	9020 J	217000	127000
Lead	ug/l	7.5	12.5	8.7	25.8	10.7	ND	101
Manganese	ug/l	150	815	1030	2160	280	15000	3530
Mercury	ug/l	2	0.10 B	ND	0.10 B	0.14 B	1.0	0.24
Nickel	ug/l	100	15.5 B	27.0 B	ND	19.9 B	346	96.1
Selenium	ug/l	50	ND	ND	ND	ND	ND	5.7
Silver	ug/l	50	ND	ND	ND	ND	ND	ND
Zinc	ug/l	5000	53.6	40.4	62.1	46.6	4000	386
Cyanide	ug/l	200	ND	ND	ND	ND	ND	ND

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TABLE 3b
SUMMARY OF GROUNDWATER INORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION			*MW-12-87-1*	*MW-13-87-1*	*MW-13-587-1*	*MW-30-87-1*	*MW-31-87*	*MW-40-88-1* [2]
	Units	**620 Standards Class I (1)**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**
Arsenic	ug/l	50	126	205	239	ND	4.4 B	68.5
Barium	ug/l	2000	448	618 B	676	ND	19.5 B	875
Beryllium	ug/l	4	1.1 B	11.0 B	12.5 B	ND	ND	1.6 B
Cadmium	ug/l	5	ND	18.9 B	ND	ND	ND	ND
Chromium	ug/l	100	8.2 B	417	528	ND	ND	24.1
Cobalt	ug/l	1000	7.6 B	179 B	216 B	ND	ND	19500
Copper	ug/l	650	ND	539	618	ND	ND	ND
Iron	ug/l	5000	32700	477000	574000	318	225	351000
Lead	ug/l	7.5	19.9	300 J	350 J	ND	ND	3.0
Manganese	ug/l	150	435	8920	10800	6.8 B	14.3 B	84400
Mercury	ug/l	2	0.13 B	0.44 J	0.51 J	ND	ND	1.3
Nickel	ug/l	100	19.7 B	403	516	ND	ND	151
Selenium	ug/l	50	ND	ND	ND	3.9 B	ND	ND
Silver	ug/l	50	ND	ND	ND	ND	ND	13.3
Zinc	ug/l	5000	74.2	1280 J	1490 J	11.6 B	ND	105
Cyanide	ug/l	200	ND	ND	ND	ND	ND	ND

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TABLE 3b
SUMMARY OF GROUNDWATER INORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION			MW-41-88-1[2]	MW-42-88-1[2]	MW-43-88-1[2]	MW-43-588-1[2]	MW-44-88-1[2]	MW-45-88-1[2]
	Units	620 Standards Class I (1)	Total	Total	Total	Total	Total	Total
Arsenic	ug/l	50	129	7.6 B	127	130	19.5	5.5 B
Barium	ug/l	2000	515	31.6 B	634	644	911	162 B
Beryllium	ug/l	4	ND	ND	ND	ND	ND	2.1 B
Cadmium	ug/l	5	6.6	ND	2.8 B	6.7	5.9	ND
Chromium	ug/l	100	78.9	13.9	18.4	18.3	19.3	4.3 B
Cobalt	ug/l	1000	402	13.4 B	86.2	88.1	1540	11.3 B
Copper	ug/l	650	117	ND	81.1	93.7	ND	ND
Iron	ug/l	5000	101000	ND	94400	96700	168000	12700
Lead	ug/l	7.5	51.3 J	11.1 J	37.1 J	42.2 J	ND	24.8
Manganese	ug/l	150	2070	343	1680	1710	2520	884
Mercury	ug/l	2	2.5 J	1.6 J	1.8 J	1.8 J	2.8 J	ND
Nickel	ug/l	100	112	14.0 B	32.4 B	23.5 B	25.7 B	12.7 B
Selenium	ug/l	50	4.5 B	ND	ND	4.7 B	ND	ND
Silver	ug/l	50	ND	ND	ND	ND	ND	ND
Zinc	ug/l	5000	287 J	59.3 J	159 J	169 J	41.6 J	40.2
Cyanide	ug/l	200	ND	ND	ND	ND	ND	ND

1. These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA.
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TABLE 3b
SUMMARY OF GROUNDWATER INORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION			MW-46-88-1	MW-47-88-1[2]	MW-48-88-1[2]	MW-49-88-1	MW-50-88-1[2]	MW-51-89-1
	Units	620 Standards Class I (1)	Total	Total	Total	Total	Total	Total
Arsenic	ug/l	50	20.3	7.0 B	287	8.2 B	24.2	10.3
Barium	ug/l	2000	231	1990	499	47.1 B	754	105 B
Beryllium	ug/l	4	1.1 B	5.7 B	ND	ND	ND	ND
Cadmium	ug/l	5	ND	15.5 B	2.3 B	ND	7.5	ND
Chromium	ug/l	100	13.7	60.9	33.4	12.7	47.0	14.6
Cobalt	ug/l	1000	16.0 B	34800	649	34.7 B	17500	19.3 B
Copper	ug/l	650	ND	ND	143	ND	ND	ND
Iron	ug/l	5000	19800	868000	105000	11300	227000	32300
Lead	ug/l	7.5	14.1	ND	80.2 J	282 J	14.8 J	13.9 J
Manganese	ug/l	150	419	74600	2660	248	23900	278
Mercury	ug/l	2	0.13 B	4.4 J	1.9 J	1.6 J	2.1 J	1.70 J
Nickel	ug/l	100	27.8 B	127 B	73	41.9	260	ND
Selenium	ug/l	50	3.2 B	ND	4.7 B	ND	ND	5.6
Silver	ug/l	50	ND	38.5 B	ND	ND	ND	ND
Zinc	ug/l	5000	56.5	170 J	367 J	48.9 J	116 J	67.4 J
Cyanide	ug/l	200	ND	ND	ND	ND	ND	ND

1. These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA.
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TABLE 3b
SUMMARY OF GROUNDWATER INORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION			MW-52-89-1[2]	MW-53-89-1	MW-54-89-1[2]	MW-54-589-1[2]	MW-55-89-1[2]	MW-56-89-1[2]
	Units	620 Standards Class I (1)	Total	Total	Total	Total	Total	Total
Arsenic	ug/l	50	4.0 B	183	64.4	80.2	113	260
Barium	ug/l	2000	360	983	574	597	1260	638
Beryllium	ug/l	4	ND	3.2 B	ND	ND	14.5 B	5.6
Cadmium	ug/l	5	3.2 B	ND	ND	ND	19.1 B	5.0
Chromium	ug/l	100	7.4 B	39.4	22.4	29.2	125	106
Cobalt	ug/l	1000	4280	51.7	1400	1320	28600	1830
Copper	ug/l	650	ND	170	61.7	78.3	242	320
Iron	ug/l	5000	100000	128000	123000	134000	541000	213000
Lead	ug/l	7.5	ND	128	9.0	12.3	122 J	198 J
Manganese	ug/l	150	13900	1850	2350	2540	104000	8750
Mercury	ug/l	2	2.2 J	0.49	0.95	0.99	2.3 J	2.0 J
Nickel	ug/l	100	19.3 B	122	58.0	64.9	364	226
Selenium	ug/l	50	3.1 B	3.8 B	5.8	6.7	ND	ND
Silver	ug/l	50	ND	6.4 B	ND	ND	45.3 B	ND
Zinc	ug/l	5000	25.3 J	502 B	72.9	89.7	1020 J	712 J
Cyanide	ug/l	200	ND	ND	ND	ND	5.0 J	ND

1. These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA.
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TABLE 3b
SUMMARY OF GROUNDWATER INORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION			MW-57-89-1	MW-58-89-1[2]	MW-59-89-1[2]	MW-60-89-1[2]	MW-61-89-1[2]	MW-62-89-1
	Units	620 Standards Class I (1)	Total	Total	Total	Total	Total	Total
Arsenic	ug/l	50	6.4 B	ND	ND	985	797	6.3 B
Barium	ug/l	2000	477	66.6 B	35.1 B	1220	2080	63.6 B
Beryllium	ug/l	4	2.4 B	ND	1.2 B	19.1 B	18.4 B	ND
Cadmium	ug/l	5	ND	ND	ND	38.3	25.6	ND
Chromium	ug/l	100	8.3 B	6.3 B	ND	377	310	ND
Cobalt	ug/l	1000	32.8 B	6.9 B	ND	303	4960	18.8 B
Copper	ug/l	650	ND	ND	ND	1610	1190	ND
Iron	ug/l	5000	62000	3610	1180	1440000	959000	1190
Lead	ug/l	7.5	17.3	1.4 J	16.6	941 J	570 J	ND
Manganese	ug/l	150	2810	439	31.4	15400	29700	413
Mercury	ug/l	2	0.10 B	1.6 J	ND	3.1 J	3.5 J	ND
Nickel	ug/l	100	48.6	ND	ND	870	951	75.7
Selenium	ug/l	50	ND	ND	ND	ND	ND	ND
Silver	ug/l	50	ND	7.1 B	ND	ND	ND	ND
Zinc	ug/l	5000	131	23.4 J	10.6 B	5530 J	2960 J	10.5 B
Cyanide	ug/l	200	ND	ND	2.2 J	ND	ND	ND

1. These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA.
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TABLE 3b
SUMMARY OF GROUNDWATER INORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION	Units	620 Standards Class I (1)	MW-63R-94-1 Total	MW-64-89-1 Total	MW-64-589-1 Total	MW-65-89-1 Total	MW-66-89-1 Total	MW-67-89-1 Total
Arsenic	ug/l	50	13.2	ND	ND	4.2 B	ND	ND
Barium	ug/l	2000	231	54.1 B	51.6 B	26.0 B	37.6 B	57.1 B
Beryllium	ug/l	4	ND	ND	ND	ND	ND	ND
Cadmium	ug/l	5	ND	ND	ND	ND	ND	ND
Chromium	ug/l	100	ND	ND	ND	48.8	ND	103
Cobalt	ug/l	1000	ND	ND	ND	ND	ND	ND
Copper	ug/l	650	ND	ND	ND	ND	ND	ND
Iron	ug/l	5000	7410 J	1840 J	502 J	2520 J	494 J	2850 J
Lead	ug/l	7.5	5.3	ND	ND	ND	ND	ND
Manganese	ug/l	150	413.0	225	66.4	44.3	116	371
Mercury	ug/l	2	0.13 B	0.17 B	0.14 B	0.10 B	ND	0.12 B
Nickel	ug/l	100	ND	ND	ND	24.7 B	ND	106
Selenium	ug/l	50	ND	ND	ND	ND	ND	ND
Silver	ug/l	50	ND	ND	ND	ND	ND	ND
Zinc	ug/l	5000	78.0	ND	ND	ND	ND	ND
Cyanide	ug/l	200	ND	ND	ND	ND	ND	ND

1. These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA.
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TABLE 3b
SUMMARY OF GROUNDWATER INORGANIC RESULTS
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION			MW-68-89-1	MW-68-589-1	MW-69-90-1	MW-70-90-1
	Units	620 Standards Class I (1)	Total	Total	Total	Total
Arsenic	ug/l	50	3.3 B	5.3 B	ND	5.2 B
Barium	ug/l	2000	41.1 B	41.6 B	33.6 B	47.7 B
Beryllium	ug/l	4	ND	ND	ND	ND
Cadmium	ug/l	5	ND	ND	ND	ND
Chromium	ug/l	100	ND	ND	ND	ND
Cobalt	ug/l	1000	ND	ND	ND	ND
Copper	ug/l	650	ND	ND	ND	ND
Iron	ug/l	5000	2290 J	2290 J	1710	516
Lead	ug/l	7.5	ND	ND	ND	ND
Manganese	ug/l	150	59.3	57.9	24.1	23.3
Mercury	ug/l	2	ND	ND	0.14 B	0.19 B
Nickel	ug/l	100	ND	ND	ND	ND
Selenium	ug/l	50	ND	ND	ND	ND
Silver	ug/l	50	ND	ND	ND	ND
Zinc	ug/l	5000	ND	ND	10.5 B	9.6 B
Cyanide	ug/l	200	ND	ND	ND	ND

1. These values represent standards for Class I groundwater under 35 IAC 620.410. Wells completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620.420). These Class I standards may not be applicable to monitoring wells within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be approved by the IEPA.
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Table 4
Preliminary Remediation Goals for COPCs for the Amoco Joliet Landfill Site
Based on Ingestion of Contaminated Groundwater by Future Residents

COPCs	Calculated PRG (ug/L)				MCL (ug/L)	Illinois 620 Class I Standard	Proposed PRG
	Target Cancer Risk			Target HI			
	1 x 10^{-6}	1 x 10^{-5}	1 x 10^{-4}	1			
ACIDS							
Benzoic acid				8343		28,000	28,000
Isophthalic acid				1669			1669
Phthalic Acid				4171		4,171	4,171
Terephthalic Acid				2086			2086
Trimellitic Acid				1460			1460
VOCS							
Benzene	3	29	294		5	5	5
INORGANICS							
Arsenic	0.06	0.57	6		50	50	50
Beryllium	0.02	0.20	2		4	4	4
Cobalt				626		1,000	1,000
Manganese				52	50	150	150
PESTICIDES							
Aldrin (Well MW-40-88)	5.0E-03	5.0E-02	5.0E-01				5.0E-01
Dieldrin (Well MW-40-88)	5.3E-03	5.3E-02	5.3E-01				5.3E-01
delta-BHC-max detect	4.7E-03	4.7E-02	4.7E-01				4.7E-01

TABLE 5
SUMMARY OF SEEP GROUNDWATER AND LEACHATE SAMPLES
AMOCO JOLIET LANDFILL RI/FS

SAMPLE LOCATION			JL-SP01-1	JL-SP02-1	JL-SP02	JL-SP03-1	JL-SP03	JL-SP52-1
Parameter	Units	620 Standards Class II						
VOLATILES								
Chloroethane	ug/l		2	ND	NA	ND	NA	ND
Acetone	ug/l		5 R	ND	NA	ND	NA	ND
2-Butanone	ug/l		7 J	5 R	NA	5 R	NA	5 R
Benzene	ug/l	5	6	ND	NA	0.7 J	NA	ND
ORGANIC ACIDS								
Terephthalic Acid	ug/ml		0.66	0.1	NA	0.25	NA	0.11
Isophthalic Acid	ug/ml		42.48	0.8	NA	1.8	NA	1
Benzoic Acid	ug/ml		55.94	0.71	NA	20.04	NA	0.8
INORGANICS								
Arsenic	ug/l	50	18.9	113	NA	10.8	NA	102
Barium	ug/l	2000	491	920	NA	186 B	NA	904
Cadmium	ug/l	5	ND	6.7	NA	ND	NA	7.2
Chromium	ug/l	100	7.1 B	123	NA	6.6 B	NA	107
Cobalt	ug/l	1000	58.3	10600	NA	11.0 B	NA	9490
Iron	ug/l	5000	63400	155000	NA	13500	NA	150000
Lead	ug/l	7.5	ND	8.3	NA	11.4	NA	ND
Manganese	ug/l	150	831	1300	NA	239	NA	1100
Mercury	ug/l	2	0.52	0.13 B	NA	0.35	NA	0.14 B
Nickel	ug/l	100	ND	200	NA	9.8 B	NA	176
Thallium	ug/l	2	ND	24.0	NA	ND	NA	22.4
Zinc	ug/l	5000	47.6	402	NA	32.4	NA	330
Cyanide	ug/l	200	ND	ND	NA	ND	NA	15.5
PESTICIDES/PCBS								
Aroclor-1248	ug/l		ND	2.0	ND	2.3	ND	ND

1 Groundwater completed in areas north and east of the landfill, in shallow groundwater or low yield conditions, i.e. MW-63R, may be more representative of Class II (35 IAC 620 420) These Class I standards may not be applicable to groundwater within the boundary of any future Groundwater Management Zone (GMZ, 35 IAC 620.250) to be established by Amoco at the site area.

2 Data Qualifiers: J indicates estimated value, R indicates data rejected during validation. Refer to Appendix J for a Summary of Data Validation.

Table 6 *Carcinogenic Risks for the Residential Scenario* [a]				
Chemical		***Ingestion of Groundwater***	***Dermal Contact with Groundwater***	***Inhalation of Volatiles during Use of Groundwater***
Aldrin	(MW-40-88) (MW-55-89)	7.98E-06 6.99E-06	NC	NC
delta-BHC	(Sitewide) (MW-64-89)	1.1E-05 5.3E-05	NC	NC
Dieldrin	(MW-40-88) (MW-43-88)	5.2E-06 5.6E-05	NC	NC
Heptachlor	(MW-40-88) (MW-43-88) (MW-55-89)	7.1E-10 7.3E-11 5.0E-10	NC	NC
bis(2-Ethylhexyl)phthalate		9.0E-07	NC	NC
Benzene		1.6E-06	4.6E-07	1.1E-06
Methylene chloride		3.0E-07	9.1E-08	4.7E-08
Arsenic		4.3E-03	NC	NC
Beryllium		1.6E-04	NC	NC
Pathway Risk (without Pesticides)		**4.4E-03**	**5.6E-07**	**1.1E-06**
Total Risk (without Pesticides)			**4E-03**	

[a] Pathway and total carcinogenic risks have been rounded to the nearest tenth.

NC Not calculated. Metals and semivolatile COPCs are not included in the quantitative analysis for these pathways. A qualitative evaluation of potential risks from semivolatile chemicals in groundwater is provided in Section 4.3.5.

Table 7 *Hazard Quotients and Hazard Indices for the Residential Scenario* [a]			
	Ingestion of Groundwater	***Dermal Contact with Groundwater***	***Inhalation of Volatiles during Use of Groundwater***
Chemical	***RME HQ***	***RME HQ***	***RME HQ***
Benzoic acid	7.2E+00	NC	NC
Isophthalic acid	1.8E+02	NC	NC
Phthalic acid	5.7E+02	NC	NC
Terephthalic acid	2.2E+01	NC	NC
Trimellitic acid	1.6E+01	NC	NC
Aldrin (MW-40-88) (MW-55-89)	1.3E-01 1.1E-01	NC	NC
delta-BHC (Sitewide) (MW-64-89)	NA	NC	NC
Dieldrin (MW-40-88) (MW-43-88)	5.3E-02 5.8E-01	NC	NC
Heptachlor (MW-40-88) (MW-43-88) (MW-55-89)	2.6E-02 2.6E-03 1.8E-02	NC	NC
bis(2-Ethylhexyl)phthalate	2.6E-02	NC	NC
Benzene	NA	NA	1.8E-01
Chlorobenzene	2.5E-02	7.4E-03	6.0E-02
1,2,4-Trimethylbenzene	7.7E-01 [b]	2.3E-01 [b]	NA
Methylene chloride	5.5E-03	1.6E-03	2.7E-04
Toluene	2.4E-03	7.3E-04	3.0E-03
Xylene	3.5E-02	1.0E-02	2.4E-02
Arsenic	7.7E+01	NC	NC
Beryllium	6.2E-02	NC	NC
Cadmium	6.5E-01	NC	NC
Cobalt	5.6E+01	NC	NC
Copper	5.8E-01	NC	NC
Iron	NA	NC	NC
Lead	NA	NC	NC
Manganese	1.3E+03	NC	NC
Nickel	7.9E-01	NA	NC
Pathway HI (without Pesticides)	**2.3E+03**	**2.3E-01**	**2.66E-01**
Total HI (without Pesticides)	**2 E+03**		

a HIs have been rounded to the nearest tenth.
b 1,2,4-Trimethylbenzene was only detected as a TIC. HQ estimates for this compound are therefore highly uncertain.
NC Not calculated. Metals and semivolatile COPCs are not included in the quantitative analysis for these pathways. A qualitative evaluation of potential risks from semivolatile chemicals in groundwater is provided in Section 4.3.5
NA RfD or RfC not available.

Table 8 *Carcinogenic Risks for the Recreational Scenario* [a]		
Pathway	*Chemical*	*RME Risk*
Incidental Ingestion of Surface Water	Aroclor 1248	1.7E-08
	Benzene	1.7E-10
	Arsenic	1.7E-07
Pathway Risk		**1.8E-07**
Incidental Ingestion of Sediment	Aroclor 1248	3.2E-07
	Arsenic	2.0E-06
Pathway Risk		**2.3E-06**
Total Carcinogenic Risk		**2E-06**

[a] Risk estimates have been rounded to the nearest tenth.

Table 9
Noncarcinogenic Hazard Quotients and Hazard Indices for the Recreational Scenario [a]

Pathway	**Chemical**	**RME HQ**
Incidental Ingestion of Surface Water	Aroclor 1248	NC
	Isophthalic acid	4.6E-04
	Benzene	NC
	Arsenic	3.2E-03
	Cobalt	1.5E-03
	Iron	NC
	Manganese	2.2E-03
	Thallium	2.6E-03
Pathway HI		**1.0E-02**
Incidental Ingestion of Sediment	Aroclor 1248	NC
	Arsenic	3.8E-02
	Manganese	9.2E-02
Pathway HI		**1.3E-01**
Total HI		**1E-01**

[a] HIs have been rounded to the nearest tenth.
NC Not calculated, an RfD is not available for this chemical.

Table 10
Summary of Overall Ecological Risks

Receptor Group	*SW Risk Estimate*	*SS Risk Estimate*	*Comments*
Aquatic plants and aquatic invertebrates	Low	NA	Aquatic exposures are limited in duration or likelihood except in the Des Plaines River where site-related contamination is not apparent.
Fish	Low	NA	Aquatic exposures are unlikely except in the Des Plaines River where site-related contamination is not apparent.
Terrestrial plants, invertebrates, and soil microbes	NA	Low to Moderate	Most risk from exposure to metals in surface soils. Only localized effects considered likely because of discrete areas of soil contamination and limited mobility of soil-dwelling animal receptors.
Small burrowing omnivorous mammals	NA	Low	Direct contact with contaminated soils or ingestion of contaminated water has lower risk than ingestion of contaminated vegetation and invertebrate prey. Except for PCB-contaminated soils at SB01, vegetation and prey not likely to be substantially contaminated with site-related COPCs. Foraging area unlikely to include or be predominately the area of soil boring SB01.
Omnivorous Songbirds	NA	Low	Direct contact with contaminated soils or ingestion of contaminated water has lower risk than ingestion of contaminated vegetation and invertebrate prey. Except for PCB-contaminated soils at SB01, vegetation and prey not likely to be substantially contaminated with site-related COPCs. Foraging area unlikely to include or be predominately the area of soil boring SB01.
Top avian/mammalian predators	Low	Low	Direct contact with contaminated soils or ingestion of contaminated water has lower risk than ingestion of contaminated vegetation and invertebrate prey. Except for PCB-contaminated soils at SB01, vegetation and prey not likely to be substantially contaminated with site-related COPCs. Foraging area unlikely to include or be predominately the area of soil boring SB01. Risks are further reduced by small size of site compared to large foraging range for most predator

Table 11 List of Alternatives		
ALTERNATIVE	COMPONENTS	BRIEF DESCRIPTION
Alternative SC-1	No Action	
Alternative SC-2	Limited Action	Cap maintenance, runoff/seep monitoring
Alternative SC-3 (see note)	Landfill cap	Single Barrier/Solid Waste (with LLDPE geomembrane or clay)
Alternative SC-4	Landfill cap	Double Barrier/RCRA composite (clay, HDPE or GCL)
Alternative SC-5	Landfill cap Waste Relocation	Double Barrier/RCRA composite (clay, HDPE or GCL) Relocate south landfill to north landfill
Alternative SC-6	Landfill cap Leachate Management Waste Relocation	Single Barrier/Solid waste (with LLDPE geomembrane or clay) Leachate collection in CAMU landfill Relocate all waste to clay-lined treatment pond areas

TABLE 12

AMOCO JOLIET LANDFILL SITE
JOLIET, ILLINOIS
FOCUSED FEASIBILITY STUDY

JOLIET LANDFILL

ALTERNATIVE SC-4A: DOUBLE BARRIER (RCRA COMPOSITE) LANDFILL COVER (CLAY, HDPE) / SURFACE WATER MANAGEMENT / GAS VENTING / DRAINAGE DITCH MONITORING / SEEP MONITORING / GROUNDWATER MONITORING
COST SUMMARY

Item Description	Total Cost
CAPITAL COSTS	
General	$224,000
Landfill Cover (RCRA composite with clay/HDPE)	$3,241,000
Surface Water Management	$27,000
Gas Venting	$8,000
Groundwater Monitoring Wells	$23,000
SUBTOTAL CONSTRUCTION COSTS (1)	$3,523,000
Bid Contingency (15%)	$529,000
Scope Contingency (20%)	$705,000
Engineering and Design (15%)	$529,000
Oversight/Health and Safety	$57,000
TOTAL CAPITAL COSTS	$5,349,000
ANNUAL OPERATING AND MAINTENANCE COSTS	
Cap Maintenance	$8,000
Drainage Ditch Sampling and Analysis	$4,000
Seep Sampling and Analysis	$5,000
Groundwater Sampling and Analysis	$81,000
TOTAL ANNUAL COSTS	$98,000
REPLACEMENT COSTS (2)	
Gas Venting (every 15 years)	$9,000
Groundwater Monitoring Wells (every 30 years)	$75,000
TOTAL REPLACEMENT COSTS	$84,000
PRESENT WORTH ANALYSIS	
Total Capital Costs (from above) (3)	$5,349,000
Present Worth Annual O&M Costs (4)	$74,000
Drainage Ditch Annual Sampling - 30 years	$50,000
Seeps Annual Sampling - 30 years	$62,000
Groundwater Monitoring	
Quarterly Sampling - years 1 and 2	$512,000
Semi-annual Sampling - years 3 through 4	$169,000
Annual Sampling - years 5 through 30	$475,000
Present Worth Replacement Costs (5)	$14,000
TOTAL PRESENT WORTH	$6,705,000

(1) Capital costs for construction items do not include oversight fees, accounted for below.
(2) Replacement costs include construction and oversight capital costs.
(3) Capital costs represent the present worth of the given alternative.
(4) The "Present Worth Annual O&M Cost" line item includes all annual costs except for costs per sampling and analysis event. Costs incurred for sampling and analysis are broken down per schedule as listed below. The number of sampling events is 8 the first year and 4 from the second year to the end of the 30 year projection. All costs are based on a 7% discount rate over a 30 year projection.
(5) Present worth of replacement costs is based on a 7% annual discount rate and replacement of gas venting every 15 years (twice over 30 year projection) and groundwater monitoring wells every 30 years.

TABLE 13

AMOCO JOLIET LANDFILL SITE
JOLIET, ILLINOIS
FOCUSED FEASIBILITY STUDY

JOLIET LANDFILL

ALTERNATIVE SC-4B: DOUBLE BARRIER (RCRA COMPOSITE) LANDFILL COVER (HDPE/GCL) / SURFACE WATER MANAGEMENT / DRAINAGE DITCH MONITORING / GAS VENTING / SEEP MONITORING / GROUNDWATER MONITORING
COST SUMMARY

Item/Description		Total Cost
CAPITAL COSTS		
	General	$224,000
	Landfill Cover (RCRA composite with GCL)	$2,769,000
	Surface Water Management	$27,000
	Gas Venting	$8,000
	Groundwater Monitoring Well Installation	$23,000
	SUBTOTAL CONSTRUCTION COSTS [1]	$3,051,000
	Bid Contingency (15%)	$458,000
	Scope Contingency (20%)	$610,000
	Engineering and Design (15%)	$458,000
	Oversight/Health and Safety	$57,000
	TOTAL CAPITAL COSTS	$4,634,000
ANNUAL OPERATING AND MAINTENANCE COSTS		
	Cap Maintenance	$5,000
	Drainage Ditch Sampling and Analysis	$4,000
	Seep Sampling and Analysis	$5,000
	Groundwater Sampling and Analysis	$81,000
	TOTAL ANNUAL COSTS	$95,000
REPLACEMENT COSTS [2]		
	Gas Venting (every 15 years)	$9,000
	Groundwater Monitoring Wells (every 30 years)	$75,000
	TOTAL REPLACEMENT COSTS	$84,000
PRESENT WORTH ANALYSIS		
	Total Capital Costs (from above) [3]	$4,634,000
	Present Worth Annual O&M Costs [4]	$74,000
	Drainage Ditch Annual Sampling - 30 years	$50,000
	Seeps Annual Sampling - 30 years	$62,000
	Groundwater Monitoring	
	Quarterly Sampling - years 1 and 2	$512,000
	Semi-annual Sampling - years 3 through 4	$169,000
	Annual Sampling - years 5 through 30	$475,000
	Present Worth Replacement Costs [5]	$14,000
	TOTAL PRESENT WORTH	$5,990,000

(1) Capital costs for construction items do not include oversight fees, accounted for below.
(2) Replacement costs include construction and oversight capital costs.
(3) Capital costs represent the present worth of the given alternative.
(4) The "Present Worth Annual O&M Cost" line item includes all annual costs except for costs per sampling and analysis event. Costs incurred for sampling and analysis are broken down per sampling schedule as listed below. The number of sampling events is [illegible] the first year and [illegible] from the second year to the end of the 30 year projection. All costs are based on a 7% discount rate over a 30 year projection.
(5) Present worth of replacement costs is based on a 7% annual discount rate and replacement of gas venting every 15 years over the 30 year projection, and groundwater monitoring wells every 30 years.

APPENDIX C

RESPONSIVENESS SUMMARY

AMOCO CHEMICAL COMPANY
Joliet Landfills Superfund Site

RESPONSIVENESS SUMMARY
for
PROPOSED REMEDIAL ALTERNATIVE
LANDFILL OPERABLE UNIT

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

March 1999

Final, March 30, 1999

TABLE OF CONTENTS

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

IN THE MATTER OF:	)	
AMOCO CHEMICAL COMPANY -	)	
JOLIET LANDFILLS SUPERFUND SITE	)	File #606-98
PROPOSED REMEDIAL ALTERNATIVE -	)	
LANDFILL OPERABLE UNIT.	)	

AGENCY DECISION

The Illinois EPA prefers remedial alternative SC-4 which is detailed on page 5.

WHO IS AMOCO CHEMICAL COMPANY?

Amoco Chemical Company (Amoco) is a subsidiary of BP Amoco Corporation. A letter from BP Amoco to Illinois EPA dated January 25, 1999, states:

> "The British Petroleum Company, p.l.c. ("BP") and Amoco Corporation ("Amoco") have merged. The transaction was closed on December 31, 1998. The new merged corporation is named BP Amoco p.l.c. The subsidiaries of both BP and Amoco (e.g., Amoco Oil Company), which hold U.S. operating permits, have not been affected by the merger. They continue in existence with no name changes. Amoco Corporation (now renamed BP Amoco Corporation) continues as an Indiana corporation and continues to guarantee financial responsibility for Amoco Production Company, Amoco Oil Company, Amoco Pipeline Company, Amoco Chemical Company, and Amoco Polymers Company."

BACKGROUND

The Amoco facility is located southwest of Joliet in Will County on the west bank of the Des Plaines River approximately one mile southeast of the intersection of Illinois Route 6 and Interstate Highway 55. It is an active manufacturing facility located on approximately 750 acres of land in a semi-rural/industrial/ agricultural area. The landfill areas cover approximately 26 acres and consist of two parcels on the southern portion of the facility. Unlike many landfills which are in mounds, these two landfills are nearly level with the surrounding topography.

From 1958 through 1975, Amoco placed approximately 5,900,000 cubic feet of wastes into the two landfills. The wastes include organics, inorganics, heavy metals, acids, plasticizers, resins, elastomers, ethers, esters, ketones, aldehydes, and general plant refuse.

In 1972, the northern landfill area was closed. The area was leveled, sloped towards the Des Plaines River, covered with two feet of clayey soil, then covered with one to two feet of silty clay to reduce infiltration. In 1973, the smaller triangular shaped southern landfill area began receiving process waste. Disposal into the southern landfill continued until 1975. These landfills were placed on the National Priorities List (NPL) in February of 1990.

There is an historical documented leachate release into the Des Plaines River associated with the landfills. Groundwater contamination has also occurred with the highest levels detected adjacent to the landfill boundaries. This NPL project was divided into two operable units: the landfill capping unit and the groundwater unit. The groundwater investigation is ongoing and will require a separate Focused Feasibility Study and public hearing.

The January 12, 1999, hearing provided an opportunity for the public to make oral and written comments on capping alternatives contained in the Focused Feasibility Study conducted by the Illinois EPA and Amoco. The Illinois EPA preferred alternative landfill cap conforms with the Resource Conservation and Recovery Act (RCRA) as well as state landfill regulations and includes a double barrier designed to prevent infiltration of precipitation into the buried wastes. Stormwater management, operations and maintenance, groundwater monitoring, leachate collection and treatment, and passive gas venting are also included in the preferred alternative.

PUBLIC NOTICE AND PUBLIC HEARING

Beginning December 10, 1998, the public hearing notice was published thrice (December 10, 17 and 24) in the Joliet *Herald-News*. The public hearing notice was published thrice (December 13, 20 and 27) in the Channahon *Chanooka Weekly*. The public hearing notice was mailed on December 8, 1998, to persons on a service list maintained by the hearing officer. The public hearing notice was posted on the Illinois EPA Internet home page on December 7, 1998 (http://www.epa.state.il.us). Notice of the hearing was sent to legislators, local officials, neighbors and interested citizens on December 8, 1998.

In accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 as amended (CERCLA) Section 117, 42 U.S.C. Section 9617 and pursuant to the Illinois EPA's *Procedures for Information and Quasi-Legislative Public Hearings* 35 Illinois Administrative Code (IAC) 164, the Illinois EPA held a public hearing on Tuesday, January 12, 1999. The public hearing began at 7 p.m. in the Channahon Park District Arrowhead Community Center, 24856 West Eames Street, Channahon, Illinois. Fifteen persons representing industry, consultants, citizens, and the office of the Illinois Attorney General attended the hearing. A court-reporter prepared a transcript of the public hearing.

RESPONSIVENESS SUMMARY

The hearing record opened on December 10, 1998, and closed on February 11, 1999. Comments postmarked by midnight February 11, 1999, were included in the hearing record. This responsiveness summary responds to questions and comments received from December 10, 1998, through February 11 (postmark), 1999, and comments from the public hearing.

FUTURE ACTIVITIES

After the close of the hearing record, the Illinois EPA evaluated all comments received before considering revisions to the proposed remedy. The remedy chosen by the Agency will be described in a document called the Record of Decision (ROD). The ROD is expected to be signed by both the Illinois EPA and the U.S. EPA. It is anticipated that the office of the Illinois Attorney General will negotiate a written legal agreement called a consent order with Amoco. Besides requiring that Amoco implement the remedy as chosen in the ROD, the consent order will address many of the legal issues and will specify the applicable state and federal regulations Amoco will follow when capping the landfills.

Illinois EPA Preferred Alternative

The landfill caps will conform to the Resource Conservation and Recovery Act (RCRA) requirements which include a double barrier designed to prevent infiltration of precipitation into the waste. This cap consists of two barrier layers -- a high-density polyethylene (HDPE) geomembrane layer over a 24-inch layer of compacted clay. The alternative also considers the use of different materials for construction of the barrier layers in the cap. The 24-inch low permeability compacted clay layer could be replaced by a geosynthetic clay liner. This material is equivalent to the clay layer, providing a low permeability backup to greatly reduce leakage through potential holes in the geomembrane. The major differences between the use of clay or synthetic materials are availability, installation and cost. Material above the double barrier (topsoil, rooting layer, drainage layer) and below (foundation layer) are common to all capping alternatives.

The components of stormwater management, operations and maintenance, monitoring and passive gas venting are also included in the preferred alternative. The cap design would include surface water management features (e.g. berms, ditches. etc.) to direct runoff away from the landfill while minimizing erosion. The loss of soil overlying the barrier via erosion would potentially result in increased infiltration over time. Maintenance of the cap primarily focuses on repairing damage from erosion and cap settlement, and promoting an even growth of vegetation to stabilize the soil layers and prevent soil erosion. A program for long-term maintenance and monitoring would be implemented as part of this alternative. Maintenance would include regular inspections of the landfill area, repair of any damage to structures or the soil vegetation cover, and removal of sediment from ditches and other areas.

A system of passive vents to allow the release of vapors from the landfill waste would be constructed as a part of the landfill cap. These vapors, produced by volatilization and/or decomposition of materials in the waste, may tend to migrate laterally after a low permeability cap is constructed.

Amoco has a leachate collection system in the southern landfill and a groundwater interceptor trench along the northern one-third of the north landfill. The effectiveness of the south landfill leachate collector has been evaluated and a new leachate collection system along the down-gradient sides of the south landfill as well as near historic seep locations at the southern end of the north landfill will be installed. Monitor wells will be placed down-gradient of the two landfills to monitor leachate that is not being captured.

This proposed remedial alternative is consistent with the National Oil and Hazardous Substances Pollution Contingency Plan and the Comprehensive Environmental Response, Compensation, and Liability Act.

Comments in regular type.
Illinois EPA responses in bold.

1. At the hearing, Ron Schmitt stated that Amoco "will continue to monitor groundwater conditions." Is Amoco also committed to installing and monitoring new wells at the site?

   At this time, Amoco has not provided a written commitment to install and monitor new wells at the site. However, Ron Schmitt (Amoco) responded at the hearing that these issues would be discussed with the Illinois EPA, alternatives considered and an agreement reached.

2. How deep are the monitoring wells?

   Jeff Prewitt (Camp, Dresser and McKee) responded at the hearing that the monitoring wells at the site range in depth from 10 feet to 80 feet.

3. I'm a neighbor there across the street from Amoco, and my concern is with the well water. I know you have test monitor wells there on site. But what about the local wells in the area, have you ever tested the wells of the neighbors there? Have they been tested?

   The residential wells around the Amoco facility have not been tested as part of this project. Monitoring well data indicates groundwater flow towards the DesPlaines River. No residences exist to the south and east between the landfills and the river.

4. Have the monitoring wells detected any contaminants in the groundwater?

   Yes, some groundwater monitoring wells on the Amoco facility have tested positive for site contaminants. Volatile and semi-volatile organic compounds, inorganic compounds (metals), organic acids, and pesticides have been detected in the groundwater near the landfills. The Remedial Investigation Report (CDM, March 1998) contains tables of data showing the detected compounds and their concentrations in the groundwater. A copy of the report may be found in the two public information repositories.

5. Has the quarry pond (Vik's Pit ?) been tested?

   The water at Vik's Pit has not been tested as part of this project. The surface water in the stream to the west of the landfills, in between the landfills and Vik's Pit, has been tested and does not exhibit any elevated levels of site contaminants. Consequently, testing of Vik's Pit is not technically necessary.

6. The proposed plan (and the FFS) specify linear low-density polyethylene (LLDPE) for the solid waste cap (Alternate SC-3) and high density polyethylene (HDPE) for the double-barrier cap (Alternative SC-4). The selection of liner material should be made during the design phase of the project since there is little difference in the infiltration values of these two materials. The 40 mil LLDPE is easier to work with than the 60 mil HDPE and has a similar performance.

The specific style and type of synthetic barrier layer used in the cap is optional and will not be finalized until the remedial design of the cap. The Record of Decision will be less specific than the Focused Feasibility Study and the Proposed Plan regarding the material. The barrier layer must meet the performance and characteristic requirements in the applicable or relevant and appropriate regulations.

7. The proposed plan states in several places that the existing leachate collection system (LCS) at the South Landfill (EG-307 sump and collection system) is "inadequate since it was not engineered to current landfill standards, little documentation as to the method of construction is available, and no performance data for the system exists" (page 16). The LCS at the South Landfill collects shallow leachate to prevent surface seeps from occurring. The surface seep likely are caused by infiltration through the cap or directly into the waste through the LCS catch basin. If the LCS is shut off, surface seeps will occur. This confirms the effectiveness of the LCS to prevent such seepage. The existing LCS will be evaluated during the design phase.

It was premature to state that the system is inadequate because of unknown construction materials and methods. However, it was accurate to state that limited information exists regarding the depth, extent, capacity, performance, and other useful characteristics of the system. This information is necessary to determine the effectiveness of the system. The purpose of a leachate collection system at any landfill is to prevent leachate from migrating from the landfill both above and below the land surface. The non-response by the landfill piezometers when the existing system was shut off leads the Illinois EPA to believe that the existing system is not collecting the majority of the leachate emanating from the landfill and therefore is probably not adequate.

8. The second paragraph of Section 6.0 of the proposed plan states that "A RCRA type cap with two barrier layers and leak detection between the barrier layers will be installed across both landfills." Although a leak detection layer is required for bottom liners of RCRA disposal cells, there are no requirements for leak detection between the two barrier layers of the cap. This is a significant design issue since any infiltration will be carried away by the drainage layer above and is not allowed to accumulate in the liner.

The Illinois EPA agrees that a leak detection system is not required in the design of the cap.

9. Amoco requests that Illinois EPA allow flexibility in specific details of the cap components in the Record of Decision. The exact material of construction and need for leak detection should be decided based on a technical evaluation during the detailed design phase of the cap. In addition, Amoco requests similar flexibility in the evaluation (and upgrades as necessary) of the leachate collection system (LCS) during the design and construction phases of the landfill cap.

Illinois EPA agrees to consider alternate components in the landfill caps and leachate collection system. As stated in response #8, leak detection in the caps will not be required.

10. Overall, Amoco is in general agreement with the remedial alternatives presented in the proposed plan for the landfill operable unit. The capping alternative (Alternate SC-4) selected by the Illinois EPA, although overly protective as based upon technical performance evaluations, does meet the criteria required under CERCLA. Amoco disagrees that a double barrier (RCRA-type) cap is required to be more protective and disagrees that waste characterization information available to the Illinois EPA at the time of the proposed plan requires such a cap. Nevertheless, the general concept of the remedial action (capping, gas venting and other components) for the landfill operable unit are acceptable to Amoco based upon the conditions outlined in the December 14, 1998, proposed plan.

The Illinois EPA hopes that the ongoing groundwater investigation will also come to a mutually agreed resolution.

11. Amoco is committed to constructing the landfill cap and performing other remedial actions outlined in the proposed plan this year (1999). As discussed with the Illinois EPA, Amoco has set aside resources and developed schedules to complete construction of the landfill caps in 1999.

The Illinois EPA will continue to work with Amoco in developing the Record of Decision and consent order for capping of the landfills.

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Distribution of Responsiveness Summary

Copies of this responsiveness summary were mailed in March 1999 to all who registered at the January 12, 1999, hearing and to all who submitted written comments. Additional copies of this responsiveness summary are available from Bill Hammel, Illinois EPA Office of Community Relations, e-mail: epa8123@epa.state.il.us or phone (217) 785-3924.

Bureau of Land Staff Who Can Answer Your Questions

Technical Questions: .... Bob Rogers .... (217) 785-8729
Legal Questions: .... Bruce Kugler .... (217) 782-5544

Hearing Record Availability

The following items are available from the Illinois EPA hearing officer for examination and review:

1. Public hearing notice.
2. Transcript of the January 12, 1999, public hearing.
3. Public hearing attendance record and authors of exhibits.
4. Hearing record exhibit list of letters, documents and notices.
5. Letters, documents and notices contained in the hearing record.

Signed: John D. Williams   Date: March 30, 1999

John D. Williams
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APPENDIX D

ADMINISTRATIVE RECORD INDEX

ADMINISTRATIVE RECORD INDEX
FOR THE
AMOCO CHEMICAL (JOLIET LANDFILL)
SUPERFUND SITE
December 1998

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 ("SARA"), requires the establishment of an Administrative Record upon which the President shall base the selection of a response action (SARA; Sec. 113(k)(1)).

The Illinois Environmental Protection Agency ("Agency") has compiled the following official Administrative Record Index for the Amoco Chemicals NPL site located in Will County, Illinois. This index and associated file will be updated by the Agency.

Please refer to information provided in the enclosed public notice/fact sheet for whom to contact concerning this index.

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273	Letter to R. Rogers: Comments on Focused Feasibility Study (FFS)	August 12, 1998	S. Baloo	16
274	Letter to R. Rogers: Transmittal of Results of the Piezometer Installation	August 28, 1998	P. Harvey	178
275	Memo to R. Rogers: Summary Sheet ARAR Review	September 29, 1998	R. Watson	2
276	Letter to S. Davis: August 20, 1998, Conference Call	September 23, 1998	S. Baloo	3
277	Letter to S. Baloo: Response to FFS Comments	October 6, 1998	R. Rogers	24
278	FFS	October 5, 1998	CDM	151

282	Hearing Notification Letters (1 copy of 99 letters total)	December 8, 1998	J. Williams	1
283	Newspaper Notification Invoices	January 1999	None	5
284	Public Hearing Transcript	January 1999	J. Heinemann	11
285	Pre-Design investigation Work Plan	February 4, 1999	K. Kamm for P. Harvey	5
286	Comments on Proposed Plan	February 10, 1999	S. Baloo	2

Federal and Sate laws, regulations, and guidance followed for this project are available at the Illinois EPA office at 1021 North Grand Avenue East, Springfield, Illinois for review and/or copying.

APPENDIX E

REFERENCES

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Anderson, Carl B., 1919, *The Artesian Waters of Northeastern Illinois*, Illinois State Geological Survey Bulletin No. 34, p. 108.

Camp Dresser & McKee Inc. (CDM). 1998a. "Amoco Joliet Landfill NPL Site, Draft Final Baseline Human Health and Ecological Risk Assessment".

Camp Dresser & McKee Inc. (CDM). 1998b. "Final Remedial Investigation Report, Amoco Chemicals (Joliet Landfill) National Priorities List Site Joliet, Illinois".

Collinson, C., M.L. Sargent, and J.R. Jennings, 1988, *Illinois Basin Region, in Sedimentary Cover-North American Craton, U.S., The Geology of North America*, Volume D-2: The Geological Society of America, p. 383-426.

Domenico, P.A., and Schwartz, F.W. 1990. "Physical and Chemical Hydrogeology".

Fetter, C.W. 1994. "Applied Hydrogeology". 3rd Edition.

Framework for Ecological Risk Assessment. EPA/630/R-92/001. Risk Assessment Forum.
EPA's *Integrated Risk Information System (IRIS)*

- *Health Effects Assessment Summary Tables (HEAST)*, and EPA criteria documents
- National Center for Environmental Assessment (NCEA)
- Agency for Toxic Substances and Disease Registry (ATSDR) *Toxicological Profiles*

Howard, P.H., et.al. 1991. "Handbook of Environmental Degradation Rates".

Illinois Historic Preservation Act. 1989. (20 ILCS 3410 and Illinois Revised Statute 1989, Chapter 127, paragraph 133d1 et seq.).

IT Corporation, 1997, *Final Remedial Investigation Report, Joliet Landfill, Amoco Chemical Intermediate Group, Joliet, Illinois.*

IT Corporation, 1995, *Final Work Plan for the Remedial Investigation for Amoco Chemical Landfill, Joliet, Illinois.*

Kiefer and Associates, Inc. December 1976, *Geotechnical Design Report for the Calumet System of the Tunnel and Reservoir Plan*, prepared for the MSDGC.

Knoerle, Bender, Stone and Associates, Inc., June 1977, *Des Plaines River System Tunnels and Shafts of the Tunnel and Reservoir Plan, Part II Geotechnical Report*, prepared for the MSDGC.

Kolata, D.R., Buschbach, T.C. and Treworgy, J.D., 1978, *The Sandwich Fault Zone of Northern Illinois*

Illinois State Geological Survey Circular 505, 26p.

Nelson, W.J., 1995, Structural Features in Illinois. *Illinois State Geological Survey, Bulletin 100*, 144p.

Patrick Engineering, Inc., 1988, *Report on the Sandwich Fault Geologic Investigation at the Amoco Chemical Joliet Facility, Joliet, Illinois.*

Patrick Engineering, Inc., 1989 *Landfill History - Amoco Chemicals Joliet Facility.*

Patrick Engineering, Inc., 1990a, *Report on the Amoco Chemical Company Landfill, Hydrogeologic Investigation, Phase II, Joliet, Illinois.*

Patrick Engineering, Inc., 1990b, *Report on the Amoco Chemical Company Joliet Landfill, Hydrogeologic Investigation, Phase III, Joliet, Illinois.*

Personal Communication to Camp, Dresser & McKee, Inc., Dennis R. Kolata, April 9, 1997, Illinois Geological Survey.

Personal Communication to Camp, Dresser & McKee, Inc., Janice D. Treworgy, April 29, 1997, Illinois Geological Survey.

Personal Communication to Camp, Dresser & McKee, Inc., W. John Nelson, May 7, 1997, Illinois Geological Survey.

Personal Communication to Camp Dresser & McKee Inc., Adrian P. Visocky, February 6, 1998, Illinois State Water Survey.

Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A) Interim Final. EPA/540/1-89/002. 1989.

Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Exposure Factors. OSWER Directive #9285.6-03.

Roadcap, G.S., Cravens, S.J. and Edwards, C.S., 1993, *Meeting the Growing Demand for Water: An Evaluation of the Shallow Ground-Water Resources in Will and Southern Cook Counties, Illinois*, Illinois State Water Survey Research Report 123.

R.S. Means Company, Inc. 1997. "Building Construction Cost Data 1997". 55th Edition.

Schacklette, H.T., J.C. Hamilton, J.G. Boerngen and J.M. Bowles. 1971. Geological Survey Professional Paper 579-0. Elemental Composition of Surficial Materials in the Conterminous United States.

Soil Conservation Service, 1980, *Will County Soils, Will County, Illinois*. U.S. Department of Agriculture.

Soil Testing Services Job #4027-H, Dated 10 19.71, *Report-Phase II-A, Proposal for Phase II-B, Engineering Investigation Relative to Existing Site for Disposal of Chemical Waste - Amoco Chemicals Company - Joliet Plant near Channahon*

United States Environmental Protection Agency (U.S. EPA). 1988. "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA". Office of Emergency and Remedial Response.

United States Environmental Protection Agency. (U.S. EPA). 1987. RCRA Guidance Manual for Subpart G Closure and Post-Closure Standards and Subpart H Cost Estimating Requirements.

United States Environmental Protection Agency. (U.S. EPA). 1994a. Disposal of Polycholorinated Biphenyls, Proposed Rule.

United States Environmental Protection Agency. (U.S. EPA). 1994b. Soil Screening Guidance.

United States Environmental Protection Agency. (U.S. EPA). 1995. Risk - Based Concentration Table.

United States Environmental Protection Agency. (U.S. EPA). 1995-1996. Integrated Risk Information System (IRIS).

United States Environmental Protection Agency. (U.S. EPA). 1995. Interim Policy for Planning and Implementing CERCLA Off-Site Response Actions.

United States Environmental Protection Agency. (U.S. EPA). 1992. Summary Quality Criteria for Water, Office of Science and Technology.

United States Environmental Protection Agency. (U.S. EPA). 1986. Quality Criteria for Water, Office of Water Regulation and Standards, U.S. EPA 440/5-86-001.

United States Environmental Protection Agency. (U.S. EPA). 1988. Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites, OSWER Directive #9283.1-2.

United States Environmental Protection Agency. (U.S. EPA). 1980. Ambient Water Quality Criteria for Polychlorinated Biphenyls, U.S. EPA 440/5-80-068.

United States Environmental Protection Agency. (U.S. EPA). 1989. Risk Assessment Guidance for Superfund: Environmental Evaluation Manual, Volume II, Final Report, EPA/540/1-89/002.

United States Environmental Protection Agency. (U.S. EPA). 1991. Risk Assessment Guidance for Superfund. Volume I. Human Health Evaluation Manual Supplemental Guidance. Standard Default Exposure Factors, Interim Final, March, 1991. OSWER Directive #9285.6-03.

United States Environmental Protection Agency. (U.S. EPA). 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A, U.S. EPA 540/1-89/002. Office of Emergency and Remedial Response.

Visocky, A.P., Sherrill, M.G., Cartwright, K., 1985, *Geology, Hydrology, and Water Quality of the Cambrian and Ordovician Systems in Northern Illinois*. Cooperative Groundwater Report 10, Illinois State Geological Survey and Illinois State Water Survey.

Visocky, A.P., 1993. *Water-Level Trends and Pumpage in the Deep Bedrock Aquifers in the Chicago Region*, 1985-1991. Illinois State Water Survey Circular 177, 44p.

Visocky, A.P., 1997, *Water-Level Trends and Pumpage in the Deep Bedrock Aquifers in the Chicago Region*, 1991-1995. Illinois State Water Survey Circular 182, 45p.

Walton, W.C., 1960, *Leaky Artesian Aquifer Conditions in Illinois*. Illinois State Water Survey Report of Investigation, 39, 27p.

Willman, H.B. and Lineback, A.L., 1970, *Surficial Geology of the Chicago Region*. Illinois State Geological Survey.

Willman, H.B., 1971, *Summary of the Geology of the Chicago area*. Illinois State Geological Survey Circular 460, 77p.

Willman, H.B., Atherton E., Buschbach T.D., Collinson C., Frye J.C., Hopkins M.E., Lineback J.A., and Simon J.A., 1975, *Handbook of Illinois Stratigraphy*. Illinois State Geological Survey Bulletin 95, 261p.

Willman, H.B., and Frye, John C., *Pleistocene Stratigraphy of Illinois*, Illinois State Geological Survey Bulletin 94, 1970.

Woodward-Clyde Consultants, 1993, *Field Sampling and Analysis Plan for Design Investigations in Support of Corrective Action and a Groundwater Management Zone, Amoco Chemical Company, Joliet, Illinois.*

Woodward-Clyde Consultants, 1995a, *Corrective Action Plan for Ground Water Remediation, Amoco Chemicals Intermediates Business Group, Joliet, Illinois.*

Woodward-Clyde Consultants, 1995b, *Groundwater Corrective Action Project, Joint Permit Application, U.S. Army Corps of Engineers, Amoco Chemical Company, Joliet Plant Area, Joliet, Illinois.*

Zheng C., G.D. Bennet, and C.B. Andrews. "Analysis of Ground-Water Remedial Alternatives at a Superfund Site." GROUNDWATER. Vol. 29, No. 6, pages 838-848.

15, 16, 33, and 42 United States Code (U.S.C.). 1998. [Specific Part and Sections Noted in Text].

32, 36, and 29 Code of Federal Regulations (CFR). 1998. [Specific Part and Sections Noted in Text].

35 Illinois Administrative Code (IAC) Part 742, Appendix C. 1997. "Tiered Approach to Corrective Action Objectives (TACO)".

35 Illinois Administrative Code (I.A.C.). 1998. [Specific Part and Sections Noted in Text].

35 Illinois Administrative Code (IAC) Part 620. 1994. "Groundwater Quality".

40 Code of Federal Regualations (CFR) 1996c. (updated through May) (Specific Part and Sections Notated in Text)

40 Code of Federal Regulations (CFR) 1993 [Specific Part and Sections Noted in Text]